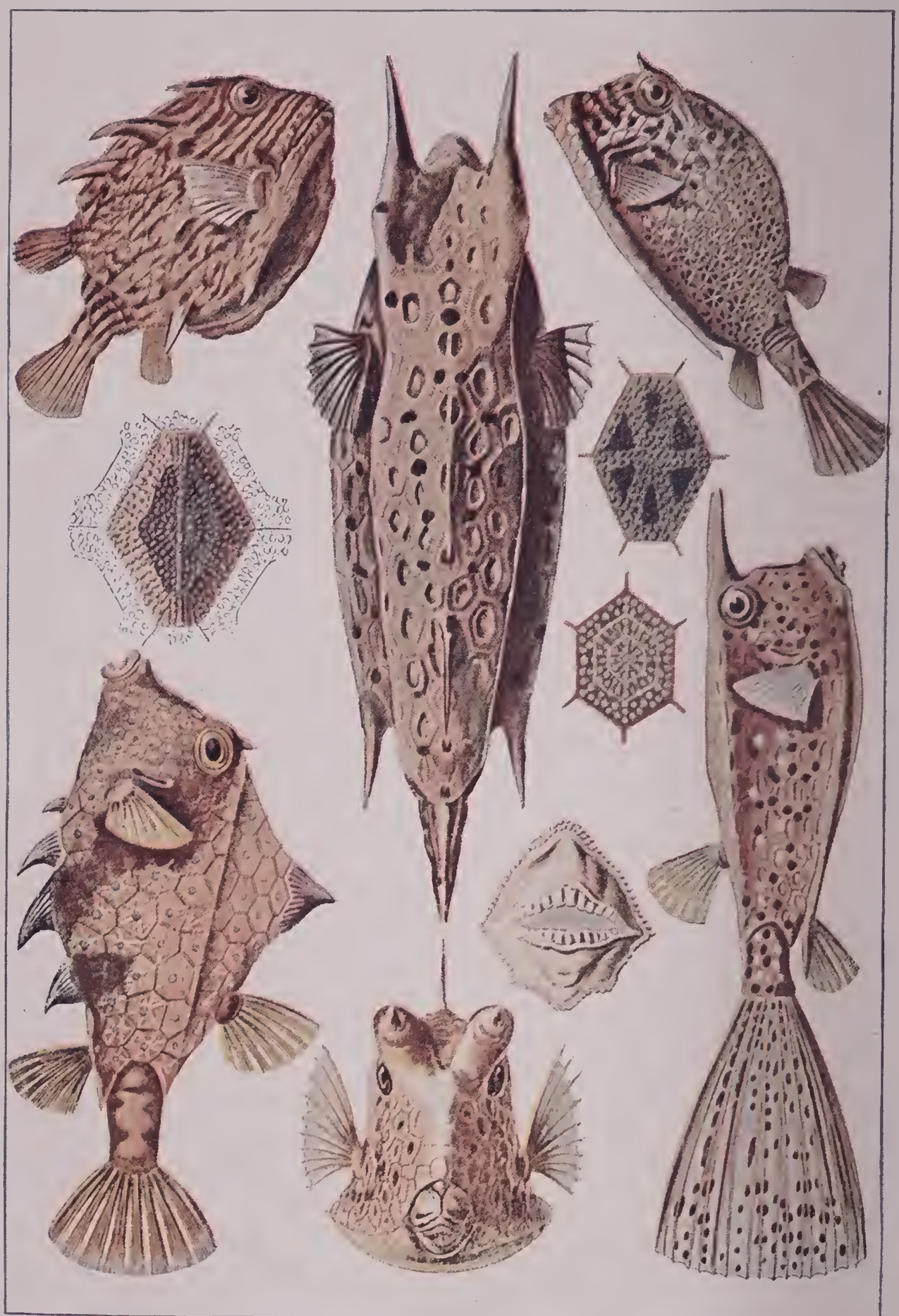
Class AE5

Book .U47

Copyright No.

COPYRIGHT DEPOSIT.



TRUNK FISH

THE UNITED EDITORS PERPETUAL ENCYCLOPEDIA

A LIBRARY OF UNIVERSAL KNOWLEDGE

COMBINED WITH AN

UNABRIDGED DICTIONARY

OF THE

ENGLISH LANGUAGE

MANAGING EDITOR

GEORGE EDWIN RINES

ASSISTED BY MORE THAN FIVE HUNDRED OF THE MOST EMINENT SCHOLARS AND SPECIALISTS

THIRTY VOLUMES

ILLUSTRATED

UNITED EDITORS ASSOCIATION
NEW YORK—CHICAGO
MDCCCCXI

AE5
.U47

Copyright, 1909

by

The United Editors Association

Copyr.ght, 1911

by

The United Editors Association

©Cl.A297620

No. 1

SCHEME OF SOUND SYMBOLS

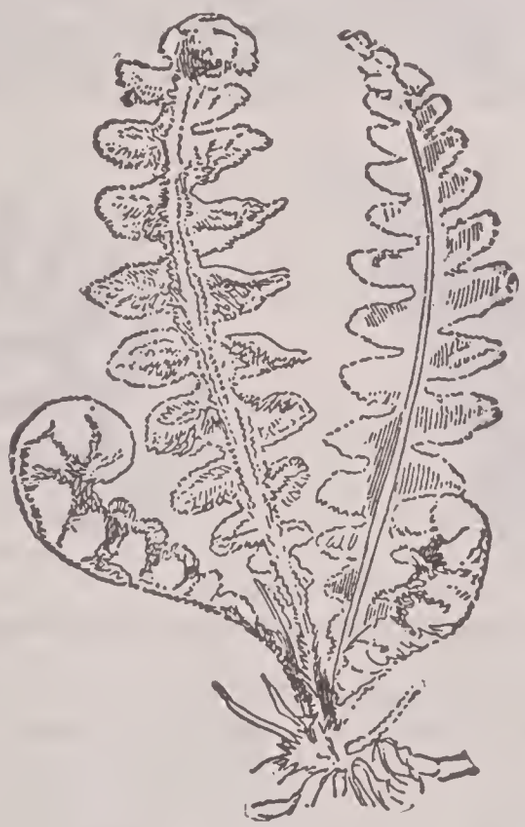
FOR THE PRONUNCIATION OF WORDS.

Note.—(-) is the mark dividing words respelt phonetically into syllables; (′), the accent indicating on which syllable or syllables the accent or stress of the voice is to be placed.

Sound-symbols employed in Respelling.	Representing the Sounds as exemplified in the Words.	Words respelt with Sound-symbols and Marks for Pronunciation.
ā	mate, fate, fail, aye	*māt, fāt, fāl, ā.*
ă	mat, fat	*măt, făt.*
â	far, calm, father	*fâr, kâm, fâ′thėr.*
ä	care, fair	*cär, fär.*
aw	fall, laud, law	*fawl, lawd, law.*
ē	mete, meat, feet, free	*mēt, mēt, fēt, frē.*
ĕ	met, bed	*mĕt, bĕd.*
ė	her, stir, heard, cur	*hėr. stėr, hėrd, kėr.*
ī	pine, ply, height	*pīn, plī, hīt.*
ĭ	pin, nymph, ability	*pĭn, nĭmf, ă-bĭl′ĭ-tĭ.*
ō	note, toll, soul	*nōt, tōl, sōl.*
ŏ	not, plot	*nŏt, plŏt.*
ô	move, smooth	*môv, smôth.*
ō	Goethe (similar to *e* in her)	*gō′tėh.*
ow	noun, bough, cow	*nown, bow, kow.*
oy	boy, boil	*boy, boyl.*
ū	pure, dew, few	*pūr, dū, fū.*
ŭ	bud, come, tough	*bŭd, kŭm, tŭf.*
û	full, push, good	*fûl, pûsh, gûd.*
ü	French plume, Scotch guid	*plüm, güd.*
ch	chair, match	*chär, măch.*
ċh	German buch, Heidelberg, Scotch loch (guttural)	*bôċh, hī′dėl-bĕrċh, lŏċh.*
g	game, go, gun	*gām, gō, gŭn.*
j	judge, gem, gin	*jŭj, jĕm, jĭn.*
k	king, cat, cot, cut	*kĭng, kăt, kŏt, kŭt.*
s	sit, scene, cell, city, cypress	*sĭt, sēn, sĕl, sĭt′ĭ, sī′prĕs.*
sh	shun, ambition	*shŭn, ăm-bĭsh′ŭn.*
th	thing, breath	*thĭng, brĕth.*
ṫh	though, breathe	*ṫhō, brēṫh.*
z	zeal, maze. muse	*zēl, māz, mūz.*
zh	azure, vision	*ăzh′ėr, vĭzh′ŭn.*

FERNS.

FERNS (*Filices*): order of flowerless plants (see EXANNULATE), belonging to the sub-kingdom or series *Pteridophyta*, which includes also the *Equisetaceæ*, Horsetails, and the *Lycopodiaceæ*, Club-mosses. F. are either herbaceous perennial plants, or more rarely trees, the rootstock or the stem producing leaf-like *fronds* (often called leaves), which are sometimes simple, sometimes pinnated, or otherwise compound, have great variety of form,



Ceterach Officinarum.

and are generally coiled up (*circinate*) in bud (see accompanying illustration). The fronds are traversed by veins, generally of uniform thickness, which are simple or forked, or netted, sometimes produced from the sides of a midrib or primary vein, sometimes from a primary vein on one side, sometimes radiating from the base of a frond or segment of a frond. The fructification takes place either on the lower surface or on the margin of the fronds, and arises from the veins. The spores are contained in capsules or spore-cases (*thecæ, sporangia*), which are often surrounded with an elastic ring, and are either naked or covered with a membrane (*involucre* or *indusium*), and are generally clustered in round or elongated or kidney-shaped masses (*sori*). The margin of the frond is sometimes folded so as to cover the spore-cases, and sometimes, as in the Flowering Fern (*Osmunda*) (q.v.), the fertile part of the frond is so transformed that its leaf-like character entirely disappears, and it becomes a spike or panicle. The spore-cases burst at their circumference, or irregularly, scattering the spores which germinate into the *prothallus*, a minute kidney-shaped cellular expansion with unicellular root hairs.

On the under surface of this, arise male and female reproductive organs, the *Antheridia* and *Archegonia*. The former develop ciliated spiral filaments, the 'antherozoids;' the latter, an oosphere from which, when fertilized, the 'fern' arises, an alternation of generations (see GENERATIONS, ALTERNATION OF) thus taking place.—The species of F. are about 2,500. They are found in all parts of the world but fewer toward the poles than within the tropics, and fewer in continental than in maritime countries, abounding exceedingly in mountainous tropical islands, as in Jamaica. Many of them delight in moisture and shade, though some are found in most exposed situations. Some

Ferns:
Showing the Sori on the back of the Fronds.

resemble mosses in size and appearance; while Tree Ferns (q.v.) resemble palms, and sometimes attain a height of 40 ft. A few are climbers. One climbing species (*Lygodium palmatum*) is found in the United States as far n. as Boston. —F. are divided into *Polypodieæ, Hymenophylleæ, Gleicheniеæ, Schizææ, Osmundeæ, Danææ,* and *Ophioglosseæ,* of which sub-orders (or orders) the first contains a great majority of all ferns.—The root-stocks of some F. contain so much starch that they are used as food, or food is prepared from them, particularly those of the Tara (q.v.) Fern in New Zealand and Van Diemen's Land, and those of *Aspidium* (or *Nephrodium*) *esculentum* in Sikkim and Nepal; also the stems of some of the tree-ferns, as of *Cyathea medullaris* in New Zealand, and *Alsophila spinulosa* in India. The young and tender fronds of some F. are occasionally used as pot-herbs in the highlands of Scotland, Norway, the Himalaya, etc. The fronds are generally mucilaginous, slightly aromatic and astringent. Those of some species of Maidenhair (q.v.) are used for making *capillaire;* while the bitter and astringent root-stocks of some F. are occasionally used in medicine, as those of the Male Fern (see under FERN) and the Peruvian *Polypodium Caliguala,* particularly as anthelmintics). The fronds of a few species are delightfully fragrant.—The cultivation of F. is now in many places conducted, both in the open air and in hothouses; and to such an extent has the occupation of fern-collecting reached, that many excellent treatises on it have been written and elaborately illustrated: Among

manuals, Gray's includes American Fern, with accompanying plates, illustrating genera. The magnificent nature-printed work, 2 vols. royal 8vo., by Henry Bradbury, supplies all needful information. Wardian cases, filled with F., have become common ornaments of apartments. For the principal species see their titles.

FEROCIOUS, a. *fĕ-rō′shŭs* [L. *fĕrox,* or *fĕrōcĕm,* fierce, cruel: It. and F. *féroce;* comp. Gael. *feargach,* angry]: savage; fierce; wild; ravenous. FERO′CIOUSLY, ad. *-lĭ.* FERO′CIOUSNESS, n. or FEROC′ITY, n. *-rŏs′ĭ-tĭ* [F. *férocité,* fierceness—from L. *ferocĭtātem*]: savage wildness; inhuman cruelty.

FER OLIGISTE, *fĕr ŏl-ē-zhēst:* mineralogical term applied to a variety of anhydrous red oxide of iron (Fe_2O_3), otherwise called *Specular Iron Ore.* The famous Swedish, Russian, and Elba iron are in greater part prepared from this iron ore. The natural position of feroligiste is in the primary rocks. See IRON.

FERONIA, *fē′rō′nĭ-a:* in *Rom. myth.,* a goddess, commonly ranked among the rural divinities, and worshipped with great solemnity both by the Sabines and the Laetins, especially by the former. In *astron.,* an asteroid, the 72d found. It was discovered by Peters, 1862, January 9. In *bot.,* a genus of Aurantiaceæ (citronworts), the order to which the orange belongs. The only known species is the wood-apple or elephant-apple (*Feronia elephantum*). It is a large and handsome tree of the East Indies.

FEROSH, n. *fĕr′ŏsh* [Hind. *furash*]: an Indian servant, in charge of tents, furniture, etc. He is expected to sweep the ground and spread carpets.

FEROZABAD, *fē-rō-zâ-bâd′:* town of India, N.W. Provinces, 24 m. e. from Agra. It was formerly named Chandwar, and was of much greater importance than at present. Pop. (1901) 16,849.

FEROZE PORE, *fē-rōz-pôr′:* named from its founder, Feroze Toghluk (reigned in Delhi 1351–88); in the Punjab; about 3 m. from the left or s.e. bank of the Sutlej, lat. 30° 55′ n., and long. 74° 35′ e. Formerly a large and important town, as its massive fortifications and extensive ruins indicate, it had sunk into poverty and insignificance before it came 1835 into the possession of the English. Since then, the place has regained much of its former consequence, holding out, with its wide streets and its colonnaded bazars, the promise of a great emporium of commerce. Politically, too, Feroze Pore has become prominent under British supremacy, having been a starting-point, whether for war or for negotiation, in many British dealings with Afghanistan and the Punjab. In connection with this feature in its history, the city contains a monumental church in honor of the memory of those, both privates and officers, who fell in the various conflicts with the Sikhs. Pop. (1901) 49,341.

FEROZE PORE is the name also of a district, of 2,752 sq.

m. It is now in part either barren or covered with jungle, but the ruins of towns and villages indicate that it must have been anciently both more fertile and more populous. Pop. (1901) 958,072.

FEROZE SHAH, *fē-rōz-shā′:* village apparently within the dist. of Feroze Pore, about 10 m. e.s.e. of the town of Feroze Pore; lat. 30° 52′ n., and long. 74° 50′ e.; about 12 m. from the left bank of the Sutlej. It is noted as the scene of the second in order of the four great battles of the first Sikh war. The battle, which lasted two days, 1845, Dec., ended in the rout of the natives and the capture of their intrenchments. The British army was commanded by Sir Hugh Gough and Sir Henry Hardinge; and, as in the victory of Mudki, gained only three days before, it sustained heavy loss.

FEROZE SHAH CANAL: artificial water-course, for irrigation; of historical interest and economical value; length, including its branches, 240 m. It dates back as far as 1356, owing its origin and name, to Feroze Toghluk (reigned in Delhi 1351–88). Viewed as a whole, it leaves the right bank of the Jumna in lat. 30° 19′ n.; and, after sweeping round so as to skirt Sirhind, a territory on the Sutlej, it rejoins its parent stream at Delhi in lat. 28° 39′, thus measuring, in mere difference of latitude, 100 geographical miles. As is usual in the East, this important channel was so much neglected, that, in the beginning of the 17th c., it was cleared out by Vizier Ali Murdan Khan, who in fact was the first to carry it, through its lower half, back into the Jumna. Finally, the entire line was, in the 19th century, again repaired and improved by the British government.

FERRANDINA, *fĕr-rân-dē′nâ:* town in the s. of Italy, province of Basilicata, on a height on the right bank of the Basento, 35 m. e.s.e. of Potenza. Good wine is produced in the neighborhood. Pop. about 8,000.

FERRANDINE, n. *fĕr′an-dīn:* a mixed stuff of silk and other materials. It probably resembled poplin: Adj. made of ferrandine.

FERRARA, *fĕr-râ′râ:* most northern of the Italian provinces washed by the Adriatic; immediately s. of the Po, between the main branch of which, and the Po di Primaro, it is for the most part inclosed. As one of the old delegation, it had 1,180 sq. m., which area is now somewhat modified. The area consists mostly of swamp and lake; and many rivers and canals intersect it. Between the Po di Volano and the Po di Primaro, the marshes become very extensive, and receive the name of *Valli di Comaccio.* This province produces great quantities of fish, affords good pastures, and has great trade in corn and hemp. It was formerly a dukedom under the House of Este, but on the failure of a legitimate male heir, Pope Clement VIII. wrested it from this family, and annexed it to the States of the Church 1598. It became part of the kingdom of Italy 1860. Pop. (1901) 271,776.

FERRARA.

FERRA'RA: ancient city of Italy, cap. of the province of Ferrara; in a low marshy plain in the delta of the Po, about 4 m. s. of the main branch of that river, 28 m. n.n.e. of Bologna, 40 m. n.w. of Ravenna. Ferrara was first made a walled city by the exarch of Ravenna about the close of the 6th c., and in the following century (661) became the seat of a bishop. In the middle ages, it was the great commercial emporium of Italy, and the seat of a court renowned throughout Europe; but now the city has a peculiarly deserted and melancholy appearance; grass grows on the pavements of its broad and regular streets, and its churches and palaces are either rapidly falling, or have already fallen, into decay. It is surrounded with walls, and is strengthened by bastions and a fortress. The old castle, or ducal palace, once the residence of the Dukes of Este, but recently, until 1860, occupied by the papal legates, rises like a huge rock, is strengthened with corner-towers, and surrounded by a ditch. Its ecclesiastical edifices, which are very numerous, and of which the churches of Santa Maria degl' Angeli and of San Benedetto are the most remarkable in architecture, are rich in paintings by the great masters of the Ferrara and Bologna schools. Besides their valuable paintings, these churches contain numerous sculptured monuments of famous persons; the church of San Francesco has a curious echo, with 16 reverberations. The university, founded 1264, was reorganized 1402, closed 1794, and reopened 1824. It is in high repute as a school of medicine and jurisprudence, and is attended by 100 to 200 students. It has an excellent library, which, besides a variety of MSS., missal paintings, and old editions of printed works, contains several of the works of Tasso and Ariosto in their own hand. Ferrara is remarkable specially for its art associations. Under the patronage of the Dukes of Este, it produced a school of painters who rank high in the history of art; while in literature the name of Ferrara is immortalized through its connection with those of Tasso, Ariosto, and Guarini.

In 1849, the Austrians took possession of the town, but were compelled to abandon it at the commencement of the Italian campaign 1859, June. In 1860, April, Ferrara, with the state of which it is cap., was formally annexed to the kingdom of Italy under Victor Emmanuel. At the period of its greatest prosperity, Ferrara had about 100,000 inhabitants. Pop. of commune (1901) 87,648.

FERRA'RA, COUNCIL OF: 16th general council of the church according to Rom. Cath. authorities; convened by Eugenius IV. for the purpose of reuniting the e. and w. churches. The first session was held 1438, Jan. 10, with Nicholas Albergati presiding as cardinal legate; the second, Feb. 15, was opened by the pope in person. On Mar. 10, the Greek emperor John VI., the patriarch of Constantinople, and several eastern prelates were present, and the discussion of the doctrinal differences between the churches be-

gan the next day. The sessions were continued without any apparent results till 1439, Jan. 10, when in consequence of the outbreak of the plague the pope transferred the council to Florence, where the deliberations were prolonged till 1442, April 26. The Council of Ferrara was a continuation of the Council of Basle, which was convened 1431: see FLORENCE, COUNCIL OF.

FERRARI, *fĕr-râ′rē*, GAUDENZIO: 1484–1549; b. Valdugia, in the Milanese; from a family which followed a career of art as if by inheritance. He was a scholar of Andrea Scotto and Perugino, and the chosen associate and friend of Raphael. His creations show genius of a bold, unshackled originality. The chief characteristics of Ferrari's style are correct and vigorous delineation, extreme vividness and delicacy of coloring, noble grace of form and attitude, and unsurpassable art in the classic disposal of drapery. Being one of the most laborious artists of his day, he executed innumerable paintings both in *fresco* and in oil, the greater part of which are in the Lombard galleries. His most comprehensive work, the frescos at Barallo in Piedmont, represents the Passion; the *Martyrdom of St. Catherine*, to which he owes his brightest fame, is in the Milanese collection of paintings. Andrea Solario was the chief among his scholars.

FERRATE, n. *fĕr′rāt* [L. *ferrum*, iron (see FERREOUS)]: a salt formed of a base with the hypothetical ferric acid (FeO_3), or trioxide of iron (see IRON). FER′RIC, a. *-rĭk*, pertaining to or derived from iron. FERRIC OXIDE, peroxide or sesquioxide of iron, Fe_2O_3.

FERREIRA, *fĕr-rā′e-râ*, ANTONIO: 1528–69; b. Lisbon: classic poet of Portugal. He was educated at Coimbra, where he studied the Italian and Latin authors, especially Horace, whom he almost rivalled in conciseness, but not in elegance. After holding a professorship at Coimbra, he obtained a civil appointment at the court of Lisbon. He carried to perfection the elegiac and epistolary styles, already attempted with success by Sá de Miranda; and transplanted into Portuguese literature the epithalamium, the epigram, ode, and tragedy. His *Ines de Castro* is the second regular tragedy that appeared after the revival of letters in Europe, the first being the *Sophonisba* of Trissino. It is still regarded by the Portuguese as one of the finest monuments of their literature, for its sublime pathos and the perfection of its style. The works of Ferreira are not numerous, as his official duties left him little leisure. His expression is strong rather than sweet, and is extremely animated. His efforts after brevity, however, frequently led him to sacrifice harmony to thought. His *Poemas Lusitanos* were published first at Lisbon, 1598, and the *Todas as obras de Ferreira*, 1771. Compare Sismondi's work, *La Littérature du Midi* (Paris 1813), and Bouterwek's *Geschichte der neuern Poesie und Beredsamkeit* (12 vols. Gött. 1801–19).

FERREL: see FERRULE.

FERREOUS, a. *fĕr′rĭ-ŭs*, or FERROUS, a. *fĕr′ŭs* [L. *ferrĕŭs*, pertaining to iron—from *ferrum*, iron]: pertaining to or consisting of iron. FERRICYANIDE, n. *fĕr′rĭ-sī′ăn-īd*, and FERROCYANIDE OF POTASH, *fĕr′rō-sī′ăn-īd* [Gr. *kŭănŏs*, dark-blue]: salts called respectively the red and yellow prussiates of potash (see FERROCYANOGEN). FERRIFEROUS, a. *fĕr-rĭf′ėr-ŭs* [L. *fĕrō*, I bear]: containing or yielding iron. FERRO, *fĕr′rō*, a prefix denoting the presence of iron, FERRU′GINATED, a. *-rô′jĭ-nā-tĕd* [L. *ferūgō*, or *ferrūgĭnĕm*, iron rust]: having the color or properties of iron-rust. FERRU′GINOUS, a. *-nŭs*, impregnated or coated with oxide of iron; chalybeate; rusty-looking. FERRUGINOUS QUARTZ or *iron flint*, a variety of quartz forming the transition to jasper, and very hard. FERRUGINOUS SPRINGS, n. in *geol.*, springs with much more than the normal amount of iron in their composition. They have a partly milky, partly ochreous hue, where the water stagnates, and cement the loose stones to which they have access. FERRUGINOUS WATERS, natural waters containing iron: see CHALYBEATE WATERS. FERRUGO, n. *fĕr-rô′gō*, a disease in plants, commonly called *rust*. FERROUS OXIDE, the rust of iron which is changed into the sesquioxide or red rust by the continual absorption of oxygen; the monoxide of iron. FERRIFEROUS ROCKS, n. in *geol.*, rocks which contain iron ore, if they do not even mainly consist of it. The bands of clay ironstone of the Carboniferous age are of this character.

FERRET, n. *fĕr′rĕt* [OF. *fleuret*, floret-silk—from It. *fioretto*, a little flower—from *fiore*, a flower—from L. *florem*, a flower]: in *OE.*, spun silk, and ribbon woven from it; a kind of tape.

FERRET, n. *fĕr′rĕt:* in *glass manuf.*, an iron used to make the rings at the mouths of bottles, or to try the melted matter.

FERRET, n. *fĕr′rĕt* [It. *furuetto;* F. *furet;* Ger. *frette*, a ferret—from Prov. *fretar;* Bav. *fretten*, to move to and fro over a surface]; (*Mustela furo*): animal of the weasel family (*Mustelidæ*) so nearly allied to the polecat (q.v.), that many regard it as a mere domesticated variety. It is of rather smaller size, the head and body about 14 inches long, the tail five inches and a half, the muzzle rather longer and more pointed, the head rather narrower; and the color is very different, being yellowish, with more or less of white in some parts, there being two kinds of hair, the longer partly white, the shorter yellow. The eyes are pink. It is much more susceptible of cold than the polecat, and requires careful protection in climates where the polecat is a hardy native. It was imported into Europe from Africa, and was well known to the Romans, being anciently employed, as it still is, in catching rabbits, for which purpose it is often sent into their burrows muzzled, or 'coped,' by means of a piece of string, to drive them out into nets or, with a string attached to it, it is allowed to seize a rabbit in the burrows, and is then drawn out, holding it fast. The usual plan, however, is to let the ferret have free range of

rabbit-holes unmuzzled, the rabbits being shot as they bolt. The ferret is used in catching rats also. Attention to warmth and cleanliness is essential to the health of ferrets. They are capable of only partial domestication, acquiring a kind of familiarity with man, and submitting with quietness to his handling, but apparently never forming any very decided attachment; and they never cease to be dangerous if not carefully watched, especially where infants are within their reach. If allowed any measure of freedom, they are ready to attack poultry, and kill far more than they can devour, merely sucking the blood. They generally breed twice a year, each brood consisting of six or nine. The female sometimes devours the young ones, in which case another brood is speedily produced. To FERRET OUT, to drive out of a lurking-place; to find out or discover as a ferret does. FER'RETING, imp. FER'RETED, pp.

FERRI, LUIGI: Italian philosopher, an eclectic: b. Bologna, 1826, June 15; d. Rome, 1895. Son of a decorative painter whom the director of the Italian theater called to Paris in 1841. Received a first prize at the College Bourbon and in 1847 entered normal school, Paris; 1850–55 was professor of philosophy at Evreux, Dieppe, Blois and Toulon; 1857 inspector of secondary schools in Italy; 1860 secretary to Mamiani, minister of public instruction; 1863–71 professor of philosophy in Institute of Superior Studies, Florence; 1871 professor of theoretical philosophy, University of Rome; 1885 editor *Revista Italiana di Filosofia.* His most important works are *The Philosophy of Right in Aristotle* (1857); *The Genius of Aristotle* (1866); *Choice Selections from the Italian Classics, with introduction, Biographical Notices and Critical Notes in French* (1868); *Essays on the History of Philosophy in Italy in the 19th Century* (1869); *Leonardo da Vinci and the Philosophy of Art* (1871); *Common Sense in Philosophy and Its History* (1872); *Vicissitudes of Philosophy at Rome* (1876); *Psychology of Association from Hobbes till Our Time* (1883).

FERRIC, FERRICYANIDE, FERRIFEROUS, etc.: see under FERRATE and FERREOUS.

FERRIDCYANOGEN, *fĕr-rĭd-sī-ăn'ō-jĕn:* compound organic radical which has not been isolated, but which forms with potassium a well-known compound used in the arts, called the ferridcyanide of potassium or red prussiate of potash. In the preparation of this salt, a solution of ferrocyanide of potassium is acted on by a stream of chlorine gas until the color of the liquid passes from yellow to deep red, and thereafter, on evaporation and cooling, finer crystals are obtained. The chlorine (Cl) acts on two equivalents of the ferrocyanide of potassium (twice $K_4Fe\ C_2N_{12}$), removing two equivalents of potassium (F) forming oride of potassium (KCl), while the remaining constituents combine together, and produce one equivalent of ferridcyanide of potassium ($K_6Fe_2C_{12}N_{12}$). The latter is

known commercially in red crystals, readily soluble in water, and yields a fine deep *Prussian blue* (Turnbull's blue) when mingled with solution of protosulphate of iron (green vitriol), and hence is used largely in dyeing and calico-printing.

FERRIER, *fĕr'rĭ-ėr*, JAMES F., LL.D.: metaphysician: 1808, Nov.—1864, June 11; b. Edinburgh; nephew of Susan Edmonston Ferrier. After studying at Oxford, where he took the degree B.A. 1832, he was admitted to the Scottish bar 1833. In 1842, he was elected to the chair of history in the Univ. of Edinburgh, and 1845 to that of moral philosophy in the Univ. of St. Andrews. He early attracted notice by some metaphysical essays in *Blackwood's Magazine;* and in 1854, he published *Institutes of Metaphysics,* in which he endeavors to construct a system of philosophy in a series of propositions, demonstrated after the manner of Euclid. He insists that neither consciousness nor matter can be known, nor indeed exist, apart from one another. He edited the works of his father-in-law, John Wilson, professor in the Univ. of Edinburgh. His own works, in 3 vols., have been edited by Sir Alex. Grant and E. L. Lushington (Edin. 1875).

FER'RIER, SUSAN EDMONSTON: novelist: 1782–1854; b. Edinburgh; aunt of James F. F. Her father, James F., one of the principal clerks of the court of session, colleague in that office of Sir Walter Scott, was intimate with the wits and literati of his day in Edinburgh, and Miss Ferrier had the benefit of literary society. Her first work, *Marriage* (1818) was followed by *The Inheritance* (1824), and *Destiny* (1831). These tales are characterized by genial wit, a quick sense of the ludicrous, and considerable ability in the delineation of national peculiarities. Miss Ferrier had the esteem and friendship of Sir Walter Scott.

FERRIS, GEORGE TITUS, American writer on music. His works include: *Great German Composers* (1879); *Great Italian and French Composers* (1879); *Great Singers* (1880–1); *Great Violinists and Pianists* (1881).

FERRIS, GEORGE WASHINGTON GALE, American engineer: b. Galesburg, Ill., 1859, Feb. 14; d. Pittsburg, Pa., 1896, Nov. 22. He was graduated at Rensselaer Polytechnic Institute in 1881; went to Pittsburg, Pa., in 1892, while in the employ of the Louisville & Nashville railroad, to inspect the structural work of the railroad bridge at Henderson, Ky. About this time he conceived the idea of a gigantic revolving wheel which he built in Pittsburg and erected for the World's Columbian Exposition in Chicago in 1893. The wheel could hold more than 1,000 passengers, and during the Exposition it was one of the great attractions.

FERRIS, ISAAC, American Dutch Reformed clergyman and educator: b. New York, 1798, Oct. 9; d. Roselle, N. J., 1873. He was graduated at the Reformed Dutch Sem-

inary, New Brunswick, N. J., 1820; was pastor at New Brunswick 1821–4; Albany 1824–6, and New York 1836–53. He was chancellor of the Univ. of the City of New York 1852–70

FERRIS, Mary Lanman Douw, American author: b. Poughkeepsie, N. Y., 1855, May 22. She was married to M. P. Ferris (q.v.) 1879, Sept. 4. She is the founder of the Daughters of the Cincinnati, and was instrumental in establishing the museum in Van Cortlandt Park, New York, now maintained by the Colonial Dames. She is the editor of the *Bulletin of the Society of American Authors*, and has published *Dutch Nursery Rhymes of Colonial Times; Random Rhymes of Old Dutch Times; History of Fort Crails;* etc.

FERRIS, Morris Patterson, American lawyer: b. New York, 1855, Oct. 3. He is a son of I. Ferris (q.v.) and was graduated from the law department, Univ. of New York, 1876. He is president of the Yonkers Historical and Library Association; secretary of the Sons of the Revolution; secretary of the Colonial War Lake George Monument Committee, secretary of the New York State Historical Association, registrar of the Society of the War of 1812, and treasurer of the Society of American Authors.

FERRO, *fĕr′rō*, or Hierro, *yĕr′rō:* most western of the Canary Isles; formerly considered the most westerly point of the old world, and for this reason geographers at one time took it as the point of departure in reckoning longitudes, as is still done by the Germans and some others. Hence, in all probability, originated the present hemispherical division of the maps of the world, Ferro being taken as the boundary-line. The English, however, have adopted the meridian of Greenwich as the first meridian and in this their example is followed by the Dutch, the Americans, and in sea-charts generally. The meridian of Ferro is 18° 9′ west of that of Greenwich: see Longitude. Ferro has 82 sq. m.; pop. 4,400.

FERROCALCITE, *fĕr-rō-kăl′sīt:* in *mineral.*, a variety of calcite containing carbonate of iron, and turning brown on exposure.

FERROCOBALTITE, n. *fĕr-rō-kō′bŏl-tīt:* in *mineral.*, a ferriferous variety of cobaltite.

FERROCYANOGEN, *fĕr-rō-sī-ăn′o-jĕn:* compound organic radical, generally regarded by chemists as existing in ferrocyanide of potassium, or the yellow prussiate of potash, but which has not yet been obtained in a separate state. The principal compound of ferrocyanogen is the ferrocyanide of potassium, prepared by heating to redness in a covered iron pot a mixture of 3 parts by weight of nitrogenized matter, such as dried blood, hoofs, parings of hides, scrapings of horn, or the flesh of old or diseased horses and other animals, 3 parts of carbonate of potash, and one part of iron filings. The carbon, nitrogen, and iron combine together, and form ferrocyanogen (FeC_6N_6

= $FeCy_6$, or Cfy), which, at the same time, unites with the potassium, and produces ferrocyanide of potassium, or yellow prussiate of potash (K_4Fe, or K_4Cfy). The compound obtained from the heated F_6N iron vessel is impure, but by repeated solutions in hot water and recrystallization on cooling, the salt is obtained pure in fine large tabular crystals of a lemon-yellow color. The ferrocyanide of potassium is largely used in dyeing and calico (q.v.) printing in the production of many shades of *Prussian blue;* and when it is treated with sulphuric acid, and subjected to heat applied, hydrocyanic or prussic acid (HCN = HCy) distils off from the mixture. The ferrocyanide of potassium is characterized by giving no indication of the presence of iron in its radical on the application of any of the tests for iron.

FERROL, *fĕr-rōl′:* strongly fortified seaport town of Spain, in Galicia; most advantageously situated on a narrow arm of the sea, 14 m. n.e. of the town of Corunna. It was originally a fishing-town, until selected for its natural advantages as a seaport by Charles III., who erected here what was at one time the finest naval arsenal in the world, and destined it exclusively for the Spanish royal navy. The entrance to the harbor formed by a narrow inlet from the Bay of Betanzos, admits of the approach of only one ship-of-the-line at a time, and is defended by the castles of San Felipe and Palma. The town is defended by walls and fortifications; is, on the whole, regularly built, and has several squares and pleasing alamedas or public walks. The arsenal, in which 15 ships-of-the-line could be simultaneously built, covers a great space; and though now in somewhat ruinous condition, is still the most important in Spain. Ferrol has manufactures of hats, naval stores, hardwares; and exports corn, brandy, vinegar, and fish. Pop. (including the garrison) (1900) 25,281.

FERROTYPE, *fĕr′rō-tīp:* term applied by Robert Hunt, the discoverer, to some photographic processes and results, in which salts of iron act an important part. Like many of the earlier paper processes, the ferrotype is far inferior in sensibility to the more modern collodion process or Archerotype, and is on that account seldom used.

FERRUGINOUS, FERRUGO, etc.: see under FERREOUS.

FERRULE, n. *fĕr′rûl,* or FERREL, n. *fĕr′rĕl* [F. *virole,* an iron ring—from mid. L. *vĭrĭŏlă,* a little circle of metal: L. *ferrum,* iron]: a ring of metal put about the end of a staff, etc., to keep it from splitting.

FERRUM, n. *fĕr′rŭm:* in *chem.,* a tetrad metallic element; symbol, Fe^{iv}; iron.

FERRY, v. *fĕr-rĭ* [Icel., *feria,* a passage-boat—from *fara,* to go: Ger. *fähre,* a ferry—from *fahren,* to go, to carry, allied to Lat. *fero,* I bear (see FARE 1)]; to carry or transport over water, as a river or a lake: N. the place or pass-

age where boats are employed to carry over passengers. FER'RYING, imp. *-ĭng.* FER'RIED, pp. *-rĭd.* FERRY-BOAT, the boat used to convey passengers over a ferry. FERRY-MAN, the boatman who attends a ferry. FERRY-RAILWAY, n. a railway the track of which is laid on the bottom of the water-course, and whose carriage has an elevated deck which supports the train.

In England a ferry, carrying passengers for pay, may be established upon a royal grant, or a prescription; but in the United States a statutory enactment of the state on whose waters the ferry is proposed to be operated is essential. This authority may be exercised directly by the legislature or by a delegation of powers to courts, commissioners, or municipalities. Without such authority no one, though he may be the owner of both banks of the river, has the right to keep a public ferry. The franchise of a ferry will, in preference, be given to the owner of the soil, but may be granted to another, and the soil of another may be condemned to the use of a ferry, upon just compensation, through the right of eminent domain. Such franchise is held to be an incorporeal hereditament, with descent to heirs, subjection to dower, and right of lease, sale, and assignment. A state has a right to establish a ferry over a navigable river separating it from another state or even from a foreign territory, though its jurisdiction extends only to the middle of such a river; and it may also erect a new ferry so near an older one as to destroy its value, unless the older franchise is protected by the terms of its grant; but an individual cannot do so without rendering himself liable to an action for damages, or a suit in equity for an injunction in favor of the first owner. The owners of a ferry, and tenants who may lease a ferry of its owners, are common carriers in law, and liable for the safe transit of goods, persons, and animals, which they receive upon their boats. Their boats, drops, and flats must be safe and adequately guarded, for their responsibility begins the moment a person or animal comes fairly on the drop, and does not cease till after the drop at the other terminus is passed.

FERRY, *fā-rē*, JULES FRANÇOISE CAMILLE: 1832, Apr. 5 —1893, Mar. 17; French statesman. He studied law, and was admitted to the bar in Paris, 1854, and connected himself with that group of young lawyers who maintained constant opposition to the empire. He became connected also with journalism, published a notable pamphlet, *La Lutte Electorale*, 1863, joined the staff of the *Temps*, 1865, and obtained wide notoriety by his attacks on Baron Hausmann's administration while rebuilding Paris 1868. In 1863 he made an unsuccessful attempt to secure election to the corps legislatif; but he was better known 1869 and succeeded. He opposed the declaration of war against Prussia, and demanded the dissolution of the corps legislatif on the ground that it no longer represented the majority in the country. At the revolution of 1870, Sep. 4, he was proclaimed a member of the govt.

of the national defense; the next day he was oppointed sec. to the govt., and the next was given charge of the administration of the dept. of the Seine. He repeatedly risked his life in efforts to suppress the Commune, was delegated to the central mayoralty of Paris 1870, Nov. 15, was elected a representative of the dept. of the Vosges 1871, Feb. 8, was prefect of the Seine, May—June, and minister to Greece 1872–3. In 1876, Feb. and 1877, Oct., he was elected to the chamber of deputies; 1879–80 was minister of public instruction and fine arts in Pres. Grévy's cabinet; 1880–81 was pres. of the council, and 1883–85 prime minister and minister of public instruction. During his tenure of the ministry of public instruction he created profound excitement through France by his efforts to exclude Jesuit teachers from the schools. The expenses and disasters of the Tonquin expedition rendered Ferry exceedingly unpopular and forced his retirement 1885. In 1890 he was again elected senator, and 1893, Feb. 24, was elected pres. of the senate. He was one of the few distinguished French politicians untouched by the Panama scandal.

FERRY, *fĕr'ĭ*, Thomas White: legislator: b. Mackinaw, Mich., 1827, June 1; d. 1896, Oct. 14. He received a public-school education and engaged in the lumber business in Grand Haven. In 1850 he was elected to the state legislature, 1856 to the state senate; 1860 was vice-pres. for Mich. of the national republican convention; 1864–71, member of congress; 1871–83, U. S. senator; 1875, Nov. 22—1877, Mar. 4, acting vice-pres. of the United States; and 1883–86, travelled extensively in Europe and the East. He was elected pres. pro tem. of the U. S. senate several times, and presided over the impeachment trial of Gen. Belknap, sec. of war, and the joint electoral meetings of congress 1876–7.

FERSEN, *fĕr'zĕn*, Axel, Count von: 1750–1810, June 20: soldier; b. Stockholm, Sweden. He entered the army of Sweden at an early age, was appointed col. of the Swedish body-guard of King Louis XVI. of France, and accompanied the French forces under Rochambeau to the U. S. After Cornwallis's surrender he received the insignia of the order of the Cincinnati from Washington, and returned to France, and endeavored to aid the royal family. Returning to Sweden he became chancellor of Upsala Univ., and grand marshal of the kingdom, and was murdered by a mob who charged him with complicity in the sudden death of Crown Prince Christian, which charge was afterward proved groundless.

FERTILE, a. *fėr'tīl* or *fėr'tĭl* [F. and It. *fertile*—from L. *fertĭlĕm*, fruitful—from *fĕrō*, I produce]: producing fruit in abundance; productive; fruitful. Fer'tilely, ad. *-lĭ*. Fertility, n. *fėr-tĭl'ĭ-tĭ*, fruitfulness; richness. Fertilize, v. *fėr'tĭl-īz*, to render productive or fruitful; to enrich. Fer'tilizing, imp.: Adj. enriching; rendering fertile. Fer'tilized, pp. *-īzd*, impregnated. Fer'tilizer, n. *-zėr*,

that which enriches: a rich manure (see GUANO: MANURES: PHOSPHATES). FER'TILIZA'TION, n. *-ī-zā'shŭn* [F.—L.]: the act of making fruitful. FERTILIZATION OF PLANTS: see FECUNDATION.—SYN. of 'fertile': fruitful; abundant; productive; rich; inventive.

FERTILITY OF SOILS: see SOILS.

FERTILIZERS: substances which increase the productiveness of soils and promote the growth of plants. The term is specifically used to designate the concentrated chemical fertilizers which are articles of commerce while manure (q.v.), is used to indicate animal excrement, compost, and other fertilizing material obtained on the farm. While manures have been employed in agriculture from very early times the introduction of commercial fertilizers is recent. The necessity for their use has arisen from the lessened fertility of the soil caused by the removal of many successive crops. The quantity of manure supplied by the farms has proved insufficient and diminished yields have attended the gradual impoverishment of the land. Commercial fertilizers are designed to supplement rather than supplant farm-yard manures, and for this purpose they have proved invaluable. They allow the farmer to return to the land the elements of fertility which have been abstracted by continued cropping and at the same time supply an abundance of plant food in an immediately available condition. Their introduction has led to a much improved system of farming. Though bones, fish, and even superphosphate of lime had been previously employed to a very limited extent, the use of commercial fertilizers may be said to date from 1840, in which year the first cargo of Peruvian guano was shipped to Europe. During the same year Liebig published his celebrated work on *Organic Chemistry* in which he pointed out the necessity of supplying to the soil the mineral constituents of plants which until then had been regarded as unimportant. Since that time the use of fertilizers containing mineral matters has come to be regarded as essential to the highest success in farming.

The principal elements of commercial fertilizers are nitrogen, phosphoric acid, and potash. These elements are essential to the growth of plants and are likely to be deficient in soils which have been long under cultivation. Nitrogen (q.v.) for use in the manufacture of fertilizers is obtained from sulphate of ammonia (one of the products of gas manufacture; nitrate of soda, vast deposits of which are found in Chili; dried blood and other refuse from slaughter-houses; fish guano (the refuse after the oil has been extracted from fish), and Peruvian guano (see GUANO) from islands on the coast of Peru. The two latter materials yield phosphoric acid and potash as well as nitrogen, and the slaughter-house refuse gives a small quantity of phosphoric acid. Bones; bone ash (bones from the great plains of S. America, burned in the open air); Canadian apatite; S. Car. phosphate rock, and Peruvian guano supply phosphoric acid (q.v.). Potash (q.v.) is obtained from wood

ashes and saltpetre, but principally from immense mines of potash salts near Stassfurt, Germany. Various grades of these salts are known as sulphate of potash, muriate of potash, and kainit. Complete fertilizers contain nitrogen, phosphoric acid, and potash. Special fertilizers also are manufactured which contain these elements in proportions varying according to the needs of the particular crops to which they are to be applied. The quantity to be used for farm crops ranges from 200 to 2,000 pounds per acre. It is applied either broadcast or in hills or drills. Used with manures or alone fertilizers act promptly and certainly, give the plants an early and vigorous start, promote rapid development, hasten maturity, increase the yield, and in a marked degree improve the quality of the product. Vast quantities are used annually by farmers and market gardeners throughout the older settled portions of the country.

FERULE, n. *fĕr′ūl*, or FERULA, n. *fĕr′ū-lă* [L. *fĕrŭla*; F. *férule*, a rod, a cane]: a rod or flat stick for inflicting punishment in a school.

FERULIC ACID, n. *fė-rôl′ĭk* [L. *ferula*, derived from plants of the genus *Ferula*]: acid existing in asafetida, extracted by precipitating the alcoholic solution with lead acetate, and decomposing the precipitate with dilute sulphuric acid. There are other methods.

FERVENT, a. *fėr′vĕnt* [F. *fervent*—from L. *fervĕn′tĕm*, boiling, hot, burning: It. *fervente*]: boiling; hot; earnest; ardent; vehement. FER′VENTLY, ad. *-lĭ*, eagerly; vehemently; with holy zeal. FERVENTNESS, n. *-nĕs*, fervency; fervor; ardor; zeal. FER′VENCY, n. *-vĕn-sĭ*, ardor: eagerness; warmth of devotion. FER′VID, a. *-vĭd*, very hot; eager; zealous; glowing. FER′VIDLY, ad. *-lĭ*. FER′VIDNESS, n. FER′VOR, n. *-vėr*, heat of mind; zeal; ardor; earnestness.

FESA, *fĕs′â* or *fā′sâ*, or FASA, *faw′sa:* town of Persia, province of Fars, 80 m. s.e. of Shiraz, in a mountain defile. It has manufactures of silken, woolen, and cotton fabrics, and some trade in a superior kind of tobacco grown in the vicinity. Pop. said to be 18,000.

FESAPO, n. *fā-sä′pō* [a word without etymological meaning but designed to have its letters symbolic]: in logic the fourth mode of the fourth figure of syllogisms. See SYLLOGISM and MOOD in logic.

FESCENNINE, a. *fĕs′sĕn-nīn* [from *Fescennium*, town of Etruria]: of or pertaining to Fescennium; licentious; lewd; obscene; scurrilous: N. a licentious, obscene, or scurrilous song, like the Fescennine verses (q.v.) of ancient Italy.

FESCENNINE VERSES, *fĕs′sĕn-nīn:* forming a department of the indigenous poetry of ancient Italy: a sort of dialogues in rude extempore verses, generally in Saturnian measure, in which the parties rallied and ridiculed one another. It formed a favorite amusement of the country-

people on festive occasions, especially at the conclusion of harvest and at weddings. As was to be expected, it often degenerated into licentiousness, that at last required the curb of the law. The Fescennine Verses are usually considered of Etruscan origin, and to have derived their name from the Etrurian town Fescennium; but there is little probabliity in this etymology. Verses of this sort were and still are popular all over Italy. The name is more likely connected with *fascinum*, fascination, enchantment, or the evil eye, against which the chanting of verses may have originally been intended as a protection.

FESCH, *fĕsh*, JOSEPH, Cardinal and Archbishop of Lyon: 1763, Jan. 3–1839, May 13; b. Ajaccio. His father, a Swiss officer in the service of Genoa, had married a widow, whose daughter by a former husband, Letizia or Lætitia Ramolino, became the mother of Napoleon Bonaparte. Fesch was thus half brother of Letizia, and uncle of the future emperor. He had entered the clerical profession, but left it at the outbreak of the French Revolution, and, 1795, became commissary to the Army of the Alps under his nephew in Italy. The First Consul having resolved on the restoration of the Rom. Cath. worship, Fesch resumed the clerical habit, and was active in bringing about the concordat with Pope Pius VII. 1801. He was 1802 raised to be abp. of Lyon, and in the following year to be cardinal. In 1804, he was sent as French ambassador to Rome, where he ingratiated himself with the pope by his adroit management and ultramontane sentiments, and contributed to induce the pope to undertake his mission to Paris to consecrate Napoleon as emperor. Fesch accompanied the pope, and assisted at the coronation; and for his services at Rome he was rewarded by the office of grand almoner and a seat in the senate. In 1806, the abp. of Regensburg, arch-chancellor and first prince elector of the just-expiring German Empire, and about to become the prince primate of the nascent Confederation of the Rhine, chose Fesch his coadjutor and successor; and, with all these dignities, he received a stipend of 150,000 florins a year. In 1809, Napoleon wished to invest him with the Archbishopric of Paris, but Fesch declined it, as he had long been dissatisfied with the emperor's policy in regard to the papal chair. In 1810, he presided at a national conference of clergy assembled at Paris, and the views which he maintained there, with even more than usual keenness brought him into disgrace with the emperor, who was still further exasperated against him on account of a letter which Fesch wrote to the pope, then (1812) in captivity at Fontainbleau, and which was intercepted. He lost his imperial dignities and pension and after this lived in a sort of banishment at his bishopric of Lyon. At the approach of the Austrians 1814, be fled to Rome with his sister Letizia, mother of the emperor, where he was received with open arms by the pope. The return of Napoleon brought him back to France, and during the Hundred Days, he was nominated a member of the chamber of peers, though he never

took his seat; but, after the battle of Waterloo, he had again to take refuge in Italy. The royalist clergy then persecuted him with accusations and lampoons which he in no way deserved. His resistance to the will of his nephew seems to have been actuated by zeal for what he considered to be the interests of the church. When called upon by the Bourbons to resign his episcopal office, he obstinately refused; and it was not till 1825, after receiving a papal brief interdicting the exercise of his clerical functions, that he resigned the charge but not the title. In 1837, an attempt was made to reinstate him, to which, however, the French government refused assent. He lived in the greatest friendship with his sister, Madame Mère as she was styled, till his death. Of his famous and very large collection of paintings, he bequeathed a part to the city of Lyon, and the rest was disposed of in a series of auctions at Rome after his death.

FESCUE, n. *fĕs'kū* [F. *fétu;* OF. *festu*, a straw: L. *festūcă*, a young shoot or stalk of a tree]: a small pointer; in *bot.*, a sharp-pointed coarse kind of grass.

FES'CUE (*Festuca*): genus of grasses of the ord. *Gramineæ*, very nearly allied to Brome-grass (q.v.), having in some species a loose, in some a contracted panicle; the spikelets many-flowered, with two unequal glumes, which they much exceed in length; each floret having two lanceolate palcæ, the outer paleæ rounded at the back, and acuminate or awned at the summit; the stigmas growing from the apex of the germen. The species are numerous, and very widely diffused over the world, in both the n. and the s. hemispheres. Among them are many of the most valuable pasture and fodder grasses. Meadow Fescue (*F. pratensis*), a species with spreading panicle and linear spikelets, two to three ft. high, common in moist meadows and pastures of rich soil, in Britain and throughout Europe, in n. Asia, and in parts of N. America, is perhaps excelled by no meadow or pasture grass whatever. It is suitable both for alternate husbandry and for permanent pasture. Spiked Fescue (*F. loliacea*)—by many botanists regarded as a variety of Meadow Fescue, though it departs from the habit of the genus in having the branches of the panicle reduced to a single spikelet, and forming a two-rowed raceme or spike—is regarded as an excellent grass for rich moist meadows.—Hard Fescue (*F. duriuscula*), a grass 18 inches to two ft. high,with a somewhat contracted panicle, mostly on one side, is one of the best grasses for lawns and sheep pastures, particularly on dry or sandy soils. Several varieties are known to seedsmen and farmers.—Creeping Fescue or Red Fescue (*F. rubra*) is probably a mere variety of Hard Fescue, distinguished chiefly by its extensively creeping roots which particularly adapt it to sandy pastures and to places liable to inundations.—Sheep's Fescue (*F. ovina*) is a smaller grass than any of these, not generally exceeding 12 inches in height, and often much less, abundant in mountainous pastures, and especially suitable for

such situations, in which it often is the principal food of sheep for many months of the year. It is common in all the mountainous parts of Europe, and in the Himalaya, it is also a native of North America, and species very similar, if not mere varieties, abound in the s. hemisphere. Its habit of growth is much tufted. TALL FESCUE (*F. elatior*) is a grass of very different appearance, four or five ft. high, with spreading much-branched panicle, growing chiefly near rivers and in moist low grounds, and yielding a great quantity of herbage, which, though coarse, is relished by cattle. *F. heterophylla* is a tall species with narrow root-leaves, and broad leaves on the culm; native of France and other parts of the continent of Europe, and extensively cultivated in the Netherlands. All these species are perennial. Some small annual species occasionally form a considerable part of the pasture in dry sandy soils, but are never sown by the farmer. A Peruvian species (*F. quadridentata*), called *Pigouil* in its native country, and there used for thatch, is said to be poisonous to cattle.

FESELS, n. *fĕs'ĕls* [F. *faséoles*—from L. *phaselus;* Gr. *phasēlos*, a sort of kidney-bean]: in *bot.*, a kind of kidney-bean or French bean.

FESSE, or FESS, n. *fĕs* [L. *fascĭă*, a band: OF. *fesse*]: in *her.*, lines or a broad band crossing the shield horizontally, and containing the third part of it, between the honor point and the nombril. It is one of the honorable ordinaries, and is supposed to represent the waist-belt or girdle of honor, which was one of the insignia of knighthood. PARTY PER FESS, said of a shield, or charge in a shield, when it is horizontally divided through the middle, or, as the French say, *coupé*. FESSWISE, said of a charge placed *in* fess; that is to say, horizontally across the shield.

FES'SENDEN, *fĕs'ĕn-dĕn*, REGINALD AUBREY, American electrician: b. Bolton, Quebec, Canada, 1866, Oct. 6. He was chemist-in-chief in Thomas Edison's laboratory from 1887 to 1890 and the two following years an electrician with the Westinghouse Company of Newark, N. J. He was professor of electrical engineering in the Western University of Pennsylvania 1893–1900. He is the author of many inventions in electrical and chemical engineering and has written numerous scientific papers.

FESSENDEN, THOMAS GREEN, American author: b. Walpole, N. H. 1771, April 22; d. Boston 1837, Nov. 11. He was graduated from Dartmouth College in 1796. He went to London in 1801, and while there published anonymously a satirical poem, *Terrible Tractoration* (1803). He returned to the United States; did literary work in New York; went to Boston and founded the *New England Farmer* (1822). Some of his publications were: *The American Clerk's Companion* (1815); *The Ladies' Monitor* (1818); and *Laws of Patents for New Inventions* (1822).

FESSENDEN, WILLIAM PITT, LL.D.: statesman: 1806, Oct. 16—1869, Sep. 8; b. Boscawen, N. H.; son of Samuel

F., LL.D., lawyer and maj.gen. of Mass. militia. He graduated at Bowdoin College 1823, was admitted to the bar 1827, began practicing in Bridgeton, Me., and settled permanently in Portland. In 1832 he was elected to the legislature as a whig, and became noted as a legislator and debater. He declined nominations to congress 1831 and 38, practiced law 1832–39, was returned to the legislature 1840 and served as chairman of the committee to revise the state statutes, was a member of congress 1841–43, was defeated for the U. S. senate 1843, was re-elected to the legislature 1845, 46, 53, and was elected U. S. senator as a whig by a democratic legislature in the latter year. He was appointed a member of the finance committee, and on his re-election 1859 became its chairman, and served as such through the war. On the resignation of Sec. Chase of the U. S. treasury dept., 1864, Fessenden was appointed his successor, and held the office till 1865, Mar., when he was re-elected to the senate.

FESSLER, *fĕs'lėr*, IGNAZ. AURELIUS: Hungarian historian: 1756–1839, Dec. 15; b. in the county of Soprony or Oedenburg. During a long life full of adventures, Fessler served successively Emperor Joseph II., the king of Prussia, and the emperor of Russia; and was prof. of oriental languages at different universities. He died at St. Petersburg. Among his works of lasting value are—*Attila* (Breslau 1794), *Hathias Corvinus* (2 vols. 1793; 2d ed. 1806 Breslau), and the *History of the Hungarians*, etc. (*Geschichte der Ungarn und deren Landsassen*, 10 vols. Leip. 1812–25). His autobiography, *Recollections of my 70 Years' Pilgrimage* (*Rückblicke auf meine 70 jährige Pilgerschaft*, Breslau 1826; 2d ed. Leip. 1851), is interesting.

FESTAL, a. *fĕs'tăl* [L. *festīvŭs*, festive—from *festum*, a festival, see FAST; but according to some, fr. Gr. *hestia*, hearth]: pertaining to a feast; joyous; mirthful. FES'TALLY, ad. *-lĭ*. FES'TIVAL, n. *-tĭ-văl* [F.—L.]: the time of feasting; an annual rejoicing; a holy-day, as church festivals; ADJ. of or pertaining to a feast or day of rejoicing. FES'TIVE, a. *-tĭv*, pertaining to a feast; joyous. FES'TIVELY, ad. *-lĭ*. FESTIVITY, n. *fĕs-tĭv'ĭ-tĭ*, the mirth at a feast; gayety; social joy at an entertainment.—SYN. of 'festival': festivity; feast; banquet; carousal; celebration.

FESTER, v. *fĕs'tėr* [Walloon, *s'efister*, to corrupt: Low Ger. *fistrig*, fusty, ill-smelling: comp. Gael. *fiasdair*, angry, inflamed]: to corrupt; to rankle; to gather matter, as a sore; to suppurate: N. a sore which discharges corrupt matter. FES'TERING, imp.: ADJ. rankling; growing more corrupt. FES'TERED, pp. *-tėrd*.

FESTINATE, a. *fĕs'tĭ-nāt* [L. *festinātŭs*, hastened, quickened]: in *OE.*, hasty; hurried. FES'TINATELY, ad. *-lĭ*, with speed; hastily.

FESTINO, n. *fĕs-tī'nō* or *fĕst'ĭ-nō* [a word without etymological meaning but designed to have its letters symbolic]: in logic the third mode of the second figure of syllogisms. See SYLLOGISM and MOOD in logic.

FESTIVALS.

FESTIVALS, or FEASTS: certain periodically recurring days and seasons set aside by a community for rest from the ordinary labor of life, and more or less hallowed by religious solemnities. Originating within the narrow circle of the family, and commemorating momentous events affecting one member or all, these pauses became more frequent, and of wider scope, as the house gradually expanded into a tribe, a people, a state. The real or imaginary founders, legislators, heroes, became objects of veneration and deification, and the salient epochs of their lives the consecrated epochs of the year. National calamities or triumphs were, in the absence of annals, remembered by corresponding general days of humiliation or exultation. Earliest of all, however, did the marked stages in the march of nature: spring and autumn, seed-time and harvest time—symbols of life and death; the soletice—turning-points of summer and winter; the new moon and the full moon; the termination of cycles of moons and cycles of years, present themselves as opportune halting-places for man himself. No less were the all-important periodical rises of fertilizing rivers, and the anniversaries of importations and inventions of new implements for the better cultivation of the soil, or tending of the flocks, befittingly celebrated. The inherent human tendency toward referring all things of graver import, life and death, abundance and want, victory and defeat, to a higher power, could not but infuse a religious feeling into epochs so marked. Fostered and guided by priests and lawgivers, this property of our nature erelong found its expression in common sacrifices, prayers, and ceremonies, consecrated to the various superior and minor deities who, it was thought, presided over and inhabited the elements of the visible and invisible creation, and who, working all the changes within them, acted each in its sphere, as a partial providence over man. According to the event which called them forth, these festivals were mournful or joyous, jubilant or expiatory. Even when sorrow was to be expressed, the mortification of the body did not always suffice, but plays, songs, dances, and processions full of boisterous mirth, were resorted to—as in the festivals of Isis at Busiris, of Mars at Papremis, in the Adonia of Egypt, Phœnicia, and Greece—because the divine wrath or sorrow was, like that of man, to be changed into satisfaction. Besides the relation between the common tutelary deity and those whom he protected, the bond also by which the otherwise disconnected members of the body-politic were held together was, by means of these festive gatherings, periodically brought in view, and invested with strength and importance. Apart, however, from this their historical, astronomical, religious, and political end, festivals served another purpose—that of growing civilization. It was the glowing spirit of emulation which, stimulating the gifted in mind and body to strive for the festive laurel in contests of genius and skill, in honor of the gods, and in the face of all the people, matured all that was noble and brilliant within the community. Archaic rudeness and rustic extravagance became refined grace and classic harmony. The stirring

drama, the glorious anthem, the melodious dance, the elegant game, which accompanied the festive sacrifice of some nations at their highest stage of development, had arisen out of those very mimicries and shouts, rude and savage beyond expression, of generations not long preceding. Enthusiastic, wild, metaphysical Egypt invested the countless days consecrated to her deified stars, plants, animals, and ideas—to the Nile, to Ammon, Kneph, Menes, Osiris; to Horus, to Neitha, to Ptah—with a mystery; sensuality, and mournfulness always exaggerated, sometimes monstrous. The Hindu, no longer daring to offer human sacrifices, shows his odd and cruel materialism by throwing into the waves, on his festival of rivers, some of his costliest goods, gold, jewels, garments, and instruments; while in the licentiousness and debaucheries perpetrated on the festival of Shiva, the god of procreation, or on the Bacchantics of the goddess Bhavani, he exceeds even those of the Egyptians on their Neitha feasts at Bubastis, and the Greek worship of Venus in her Cyprian groves. Phœnicians and Assyrians, Babylonians and Phrygians, according to the little we know of their religions and manners, appear to have feasted, thanked, propitiated, mourned all at different times, and in the way most befitting their several natures, even in the case of those gods and festivals which they had in common.

The ancient Persians alone of all nations had no festivals, as they had no temples and no common worship. These 'Puritans of Polytheism,' who worshipped the sun only, and his representative on earth, fire, scorned show and pomp, and large religious gatherings. A striking contrast to them is formed, in another hemisphere, by the ancient Mexicans, who were found to possess one of the most richly developed calendars of festivals, scientifically divided into movable and immovable feasts. A strange and singular phenomenon among festivals, is that 'of the Dead or Souls,' celebrated among the wild tribes of N. Ameriea. At a certain time, all the graves are emptied, and the remains of the bodies buried since the last festival are taken out by the relatives, and thrown together into a large common mound, amid great rejoicings and solemnities, to which all the neighboring tribes are invited.

Greece had received the types of civilization, religion, and art from Egypt and the East generally, but she developed them all in a manner befitting her glorious clime and the joyous genius of her sons. At the time of the *Iliad*, two principal festivals only—the harvest and the vintage—seem to have been celebrated (ix. 250); but they increased with such rapidity, that in the days of Pericles they had reached, the number of a thousand; some indeed being an epitome only of their memorable feats of arms, others restricted to one town, or province, or profession, or sex, or to a few initiated, or recurring only at intervals of several years; but there were so many kept by the whole people, that ancient writers bitterly denounce them as merry beginnings of a sad end, as the slow but sure ruin of the commonwealth. Their forebodings proved true; yet Greece would certainly

never have reached the highest place among nations, as far as literature, the arts, and philosophy are concerned, had it not been for the constant contests attached to her many festivals. She resisted Asia, because her citizens were always alert, always ready. The religious part of the festival —homage offered to personified ideas—consisted mostly in carrying about of the deity of the day to the sound of flute, lyre, and hymns, and in a sacrifice, followed by a general meal upon certain portions of the animal offered. Then followed scenic representations symbolizing the deeds of the gods; after which came games and matches of all kinds—foot, horse, and chariot races, leaping, boxing, throwing, wrestling, etc. (For separate accounts of the more remarkable Greek festivals, see BACCHUS: ELEUSINIAN MYSTERIES: PANATHENÆA: ETC.) There were also special times set aside for the 'Holy Games' proper. The most important of these were the Olympian, the Pythian, the Nemean, and the Isthmian. (See these titles.) As all these festivities were provided out of the public purse—from the confiscated estates of the 'tyrants' and political delinquents—the individual did not suffer more than a welcome interruption of his usual business, and under that genial sky the penalty to be paid for occasional indolence was not too heavy.

Rome having been founded amid pastoral festivities in honor of some god Pales, adopted and acclimatized, as she went on from conquest to conquest, the foreign deities, exactly as, with her usual prudence and practical sense, she conferred her right of citizenship on her foreign inhabitants, and on the whole nations subjected to her rule. Her yoke was thus less galling to the new provinces, while the populace at home found sufficient distraction in the many ancient and newly imported festivals, with their quaint rites and gorgeous pageantry. Yet the Romans—more parsimonious and abstract by nature than the vivacious Greek neighbors from whom they had accepted the greatest part of their religion—never exceeded in their festivals the number of one hundred, and in these, again, a distinct line was drawn between civil and religious ones. Some of the principal religious festivals were the Sementinæ, Jan. 25—the rural festival of the seed-time; the Lupercalia, in honor of Pan; the Cerealia; the night festival of the Bona Dea; Matronalia; Minervalia; etc. To the purely civil ones belong the Janualia—Jan. 1, the new-year's day when the new consuls entered upon their office, and friends used to send presents (*strenæ*) to each other; the Quirinalia, in memory of Romulus, deified under the name of Quirinus; and the Saturnalia, in remembrance of the golden age of Saturn, beginning Dec. 19. The celebration of these festivals was in all respects imitated from the Greeks, with this difference only, that the games connected with them became, with the pre-eminently bellicose Romans, terribly lifelike images of war. Their sham sea-fights; their pitched battles between horse and foot, between wild beasts and men; their so-called Trojan games, executed by the flower of the nobility; their boxing-matches (with gloves that had lead and iron sewed into them): circus, arena, and amphi-

theatre gave, especially in later times, the greater satisfaction the greater the number of victims.

It is one thing only that monotheism has in common with polytheism with respect to its festivals—namely, that they are with each the religious expression of human joy or human sorrow or human hope. But polytheism, with a dim misgiving of some awful and supreme power, invited the multifarious governors of the many provinces of nature to partake, as guests, of bodily and intellectual feasts, *together* with their hosts; whereas monotheism, binding up all fear and all hope, all gratitude and all awe, which moved the heart of man, in one almighty Creator, Mover, and Maintainer of all things, celebrated its festivals in honor of this omnipresent Spirit with a veneration, a purity, and a lofty elevation, such as the worshippers of star, animal or image never knew. With the first and strictest monotheists, the Hebrews, whose very existence as a nation was traced to the special and miraculous interference of this only living God, the remembrance of that great event, their liberation from Egypt, and the momentous period of preparation in the desert which followed it, mingled with almost all their religious observances, and especially their festivals, and infused into them all a tone of gratitude; while it held ever before their eyes the cause of their nationality, and their aim and destiny 'to be a kingdom of priests and a holy people.' The Hebrew festivals, too, are of a historical, agricultural, astronomical, and political nature; but they mostly combine all these characteristics, and are always hallowed by the same religious idea, and the same piety and devotion to one and the same holy name. Connected with their festivals were no plays and no representations of a god's deeds, no games and no cruelty, no mystery and no sensuality, but the sacrifice of the day, and a special occupation with the divine law, were the visible signs of the exalted seasons. The influence of the number seven—an influence notable among most eastern nations—is seen in the recurrence of many of the Jewish solemnities: see SEVEN. The sabbath (q.v.), was first and most important of these septenary festivals, concerning the service in the temple, and the mode of observing this and the other festivals since the destruction of the temple, see HEBREWS JEWS. The most exalted of new-moon festivals was that of the first day of the seventh month, 'the day of remembrance of the sounding' or 'of trumpets' (Lev. xxiii. 24), to which in later times, when the Seleucidian era was introduced (the Syrian year beginning with the autumnal equinox), the name of Rosh hashana (New Year) was given; notwithstanding that in Ex. xii. 2, Nisan is spoken of as the first month of the year. After a period of six years of labor, the earth, too, was to celebrate a Sabbath-year; what it produced spontaneously belonged to the poor, the stranger, and to animals. It is remarkable that even Alexander the Great and Cæsar remitted the taxes of Judea in this year of *Shemitta* (abandoning). After a revolution of seven times seven years, the year of Jubilee or Jobel was to be celebrated, in which all the Hebrew slaves

were set free, and all land which had been sold in the interval was restored to the former owners, in order that the original equilibrium in the families and tribes should be maintained intact. (These two epochs however, were, according to the Talmud, not kept, as festivals before the Babylonian captivity.) The pre-eminently agronomical and historical festivals were the three *Chaggim* (whence the Arab. *Hagg*, a pilgrim to Mecca)—viz., pesach (Passover), Schabuoth (Feast of Weeks), and Succoth (Feast of Tabernacles); on which three every man of proper age was obliged to go up to Jerusalem and offer some of the first fruits, besides the prescribed sacrifices (see PASSOVER: ETC. —For the postmosaic and exclusively historical festivals, Purim, the feast of Haman, Chanuca, the feast of the Maccabees, see JEWS.

The Christian festivals (see their several titles) were for the most part grafted, in the course of time, upon the Jewish and Pagan ones, but always with a distinct reference to Christ and other holy personages. The weekly day of rest was transferred from Saturday to the first day of the week, and called the day of joy, or Resurrection, as the weekly Jewish fasts of Monday and Thursday were changed for Wednesday and Friday: see FASTS. For a long time, both the Sabbath (Saturday) and the Lord's Day (Sunday) were celebrated, especially in the East. Two separate celebrations took the place of the Jewish Passover: the *Pascha Staurosimon* was the festival of the Death, the *Pascha Anastasimon* of the Resurrection of our Lord (see EASTER); and the festival of Pentecost, or the law-giving at Sinai, became the festival of the outpouring of the Holy Spirit and of the inauguration of the New Covenant and the Christian Church. In the 4th c., two new festivals were introduced: Epiphany (q.v.), which originated in the East; and the Nativity or Christmas (q.v.). Circumcision, Corpus Domini, the festivals of the Cross, of Transfiguration, of the Trinity, and many others, are of still later date. The veneration felt for the Virgin Mary as the Mother of our Lord found its expression likewise in the consecration of many days to her special service and worship; such as that of her Presentation, Annunciation (Lady's Day) Assumption, Visitation, Immaculate Conception (q.v.), and many minor festivals, besides the Saturdays, which in some parts were entirely dedicated to her, in order that the Mother might have her weekly day like the Son. Besides these, there were festivals of Angels, of Apostles, Saints, Martyrs (on the supposed anniversary of their death, called their birthday, *dies natalis*), of Souls, Ordinations, etc.

Celebrated at first with all the primitive simplicity of genuine piety, most of these festivals were ere long invested with such pomp and splendor that they surpassed those of the ancient Greeks and Romans. Burlesque, even coarse and profane representations, processions, mysteries, and night-services, were, in some places, though unauthorized by the general church, connected with them, and voices within the church loudly denounced these 'pagan practices.' Ordinances forbidding mundane music and

female singers for divine service were issued, the vigils were transformed into fasts, days of abstinence and penance were instituted, partly as counterpoises, but with little result. Nor did the prodigious increase of these festive occasions, and the rigor with which abstinence from labor was enforced in most cases, fail to produce the natural results of indolence and licentiousness among the large mass of the people. Bitter and frequent were the complaints throughout Christendom; but though even men like Abp. Simon of Canterbury (1332), Petrus de Alliaco, Nicolaus of Clemangis, did their utmost to obtain a reduction of these festive occasions, which overspread well-nigh the whole year, it was only after the most decided and threatening demands, such as that pronounced by the German Diet of Nürnberg 1522, that Pope Urban was prevailed upon reduce the number for Rom. Cath. Christianity (1642). Benedict XIV. (1742), Clement XIV. (1773), followed in the same direction. The reformation wrought a change both in their number and in the manner of their celebration.

The Christian festivals have been divided variously: into *feriæ statutæ* (returning annually at fixed times), *indictæ* (extraordinary, specially proclaimed), *duplicia* (double reminiscence, or of higher importance), *semiduplicia* (half double), etc. Another division is into weekly and yearly feasts, these latter being subdivided into greater and minor, or into movable and immovable. There is also a distinction made between *integri* (whole days), *intercisi* (half-days), etc. Beside the church festivals, there are also in some countries, civil days of annual religious observance (Thanksgiving Day, Fast Day), commended to all the people by proclamation from the civil power. The only trace of the ancient manner of dating a festival from the eve or vesper of the previous day—a practice discontinued since the 12th c., when the old Roman way of counting the day from midnight to midnight was reintroduced—survives in some regions in the 'ringing in' of certain days of special solemnity on the night before, and in the fasts of the vigils.

On some of the principal Mohammedan festivals, based partly on those of the Jews and Christians, such as the weekly Friday, the Yom Ashoora (Jewish Day of Atonement), the Birthday of the Prophet (Molid An-Nebee), that of Hussein, of Mohammed's granddaughter Zeyneb, of the Night of the Prophet's Ascension to Heaven (Leylet Al-Mearag), the Night of the Middle of the Month Shaabán, in which the fate of every man is confirmed for the ensuing year; the Eed Al-Shagheer or Ramadan-Beyram, at the end of the Ramadan fasts, and the Eed Al-Kabir, or the great festival of the Sacrifice (Kurban Beyram), see MOHAMMEDANISM. For further information, see Herodotus (ii. 60); Plutarch (vii.); Strabo (vi. and x.); Ovid, *Fasti;* Macrobius, *Sat.* i. 7, 11; Meursius, *Græcia Feriata;* Meiners, *Geschichte d. Relig.;* Fasold, *Ierologia;* Bible; Mishna; Gemara; Shulchan Aruch; Josephus; Philo; Maimonides; Buxtorf. *Lex. Talm.; Synag. Jud.;*

Bartolocci, *Bibl. Rabb.*; Lightfoot, *Hor. Hebr.* and *Talm.*; Lund, *Bibl. Hebr.*; Wette, *Archæologie;* Neander, *Hist. of the Ch.;* Blackmore, *Christ. Antiq.;* Baumgarten, *Erläuterung d. chr. Alterth.;* Siegel, *Handb. d. chr. Alterth.;* Mai, *Discorsi di Argomento Religioso;* Koran, etc.

FESTOON, n. *fĕs-tôn′* [F. *feston*—from It. *festone,* a garland—from mid. L. *festōnem:* probably connected with mid. L. *festis;* OF. *fest* and *faiste;* F. *faîte,* a top, a ridge]: a chain or string of a number of things hanging downward in a curved form between two points, as flowers or fruits: in *architecture,* an ornament in the form of a wreath of flowers, leaves, or fruit, frequent in Roman and renaissance buildings. Like many of the other ornaments of classic architecture, it owes its origin to one of the sacrificial emblems, viz., the flowers with which the heads of the animals, the altars, etc., used to be decorated. The festoon occurs with bulls' heads on the frieze of the temple of Vesta at Tivoli. The fig. is an example of a renaissance festoon, from the library of St. Mark's at Venice. FESTOON, v. to adorn with festoons. FESTOON′ING, imp. FESTOONED′, pp. *-tônd′:* ADJ. made into festoons or adorned with them.

Festoon:
St. Mark's Library, Venice.

FESTUCEÆ, n. *fĕs-tū′sē-ē* [L. *festuca*]: in *bot.*, tribe of grasses containing two families, *Bromidæ* and *Bambusidæ,* the type of which is Festuca or Fescue-grass: see FESCUE.

FESTUS, *fĕs′tŭs,* SEXTUS POMPEIUS: Latin lexicographer, of the 3d or 4th c.; is one of the most important ancient authorities on the Latin language. He made an epitome of the great work of Verrius Flaccus, *De Verborum Significatione.* This compilation, arranged alphabetically in 20 books was further abridged and spoiled in the end of the 8th c. by Paul, son of Warnefried, commonly called Paulus Diaconus. The great work of Flaccus has unfortunately entirely perished, and of the abridgment made by Festus, only a single MS., and that deplorably imperfect, has survived. It was brought from Illyria, and fell into the hands of Pomponius Lætus, a distinguished scholar of the 15th c. It ultimately passed into the library of Cardinal Farnese, at Parma, and is now preserved at Naples. The work, in spite of all its imperfections, is a grand storehouse of knowledge on points of mythology, grammar, and antiquities. All previous editions of Festus are of little value compared with that of K. O. Müller (Gött.

1839), in which he has made use of the Farnese MS. and other sources distinguishing the value of each.

FET, v. *fĕt* [AS. *fetian*, to fetch, to bring to: Sw. *fatta*, to seize]: in *OE.*, to fetch. FET, pp. fetched.

FETAL, a. *fē′tăl*, FETATION: see under FŒTUS.

FETCH, v. *fĕch* [AS. *fetigean;* Fris. *fetje;* Sw. *fatta;* Ger. *fassen*, to seize: Bav. *fessen*, to bring home]: to go and bring; to heave, as a sigh; to bring, as its price; to reach; in *OE.*, to effect or perform. FETCH′ING, imp. reaching. FETCHED, pp. *fĕcht*. To FETCH UP, to carry up; to take forward; to make up lost time. To FETCH OUT, to develop; to cause to come or appear. To FETCH A COMPASS, to make a circuit in order to reach.—SYN. of 'fetch': to bring; bear; carry; convey; transport; get; perform; attain.

FETCH, n. *fĕch* [Ger. *fatzen*, tricks: Bav. *fatzen*, to play tricks, to jest]: in *OE.*, a trick; the pretense to do one thing while another is intended; a stratagem.

FETCH, n. *fĕch*, or FETCH-CANDLE [in Scand. myth. *Vætt*, a kind of goblin; *Vætt-lys*, the Vætt's candle]: the apparition of one who is alive; a nocturnal light as of a moving-candle; the ignis fatuus or Will-o'-the-wisp. FETCH, LIGHTS, the appearance at night as of a lighted candle—supposed to prognosticate death.

FÊTE, n. *fāt* [F. *fête*—from OF. *feste*—from L. *festum*, a festival]: a festival or holiday; a gala-day; a showy reception of company. FETED, a. *fā′tĕd*, honored with a festive entertainment. FETE-CHAMPETRE, n. *fāt-shŏng-pātr* [F.]: entertainment in the open air; a rural festival. FETE DIEU: see CORPUS CHRISTI.

FETICH, or FETISH, n. *fē′tĭsh* [F. *fètiche*—from Port. *feitiço*, magic: comp. Gael. *faidh*, a prophet]: among *African negroes*, the selection of any object, as a stone, a tree, a feather, etc., as the supposed residence of a spirit, for temporary worship. FETICHISM, n. *fē′tĭsh-ĭzm*, also FE′TICISM, n. *-tĭ-sĭzm*, worship of *fetiches*. The word fetich, from the Portuguese, somewhat modified, passed into the French language, through Brosse's treatise. *Du Culte des Dieux Fétiches* (Dijon 1760), and from him into German through the medium of Pistorius (Stralsund 1785). The term has now received European reognition. A fetich is anything in nature or art to which a magical power is ascribed, e.g., stones, carved figures, or certain parts of plants, animals, etc. In this general sense fetichism coincides with the belief in charms—a belief found also among monotheistic nations. The first step *out of fetichism*, is when ignorant tribes cease to be satisfied with believing merely in the magical power inherent in their fetiches, and begin to ascribe a certain conscious operation to the objects of their reverence, especially to the fetiches in the forms of beasts or men. In this way the fetich becomes an idol, and fetichism an idolatry. The lowest form of such idolatry is where the savage does not hesitate to throw away, to chastise, or even to destroy his fetich, if it

does not appear to gratify his desires. The reverence for sacred woods, mountains, streams, etc., which formed part of the religion of the old Greeks, Celts, and Germans, is not fetichism proper, but belongs rather to the worship of nature.

FETID, a. *fĕt'ĭd* or *fē'tĭd* [F. *fétide*—from L. *fœtĭdŭs*, stinking: It. *fetido*]: having a strong offensive smell; stinking. Fe'tidness, n. the quality of smelling offensively. Fe'tor, n. *-tėr*, a strong offensive smell. Fetid limestone, variety of limestone which gives out, on being violently rubbed, or struck with a hammer, a smell like that of sulphuretted hydrogen gas. It has a dark color, produced probably from the perishable portions of the animals whose hard skeletons compose the rock. This animal matter may perhaps be the cause also of the disagreeable smell. Stinkstone and Swinestone are characteristic names for this limestone.

FETLOCK, n. *fĕt'lŏk*, or Fetterlock [Swiss, *fiesloch*; Dut. *vitlok*, the pastern of a horse: Swiss, *fisel*, unravelled threads hanging from a garment: comp. Icel. *fet*, a pace; *lokkr*, a lock of hair: Icel. *fit*, a webbed foot]: in *horses*, the tuft of hair growing a little above the back part of the hoof; the joint on which such hair grows; in *her.*, a horse fetlock seems to denote an instrument fixed on the leg of a horse when put to pasture, for preventing him from running off. In *Scotch heraldry*, a hoop is usually substituted for the chain. Fet'-locked, a. *-lŏkt*, having fetlocks; tied by the fetlocks.

FETOR, *fē'tôr*, a peculiarly offensive odor, usually considered to be due to some sort of animal putrefaction. Fetor of the breath may be due to sores of the tongue, cheeks, or gums, to necrosis of the teeth or abscess of the teeth cavities, to poisoning of mercury and the sordes of scurvy. Diphtheretic and streptococus inflammations of the throat cause bad odors that closely resemble fetor. Gangrene and abscess of the lungs cause the most persistent and penetrating fetor. In various diseases of the stomach and intestines accompanied by the absorption of products of putrefaction, fetor of the breath is common. Fetor of the feet is due to lack of porosity of their leather covering and to uncleanliness and excessive perspiration. These conditions result in a maceration of the skin and if infection with certain forms of bacteria takes place this macerated skin is apt to be infected with putrefactive bacteria and consequent upon this is more or less fetor. The treatment of the condition consists in cleanliness, improvement of the foot-gear and antiseptic washes.

FETTER, n. *fĕt'tėr*—usually in the plu. Fet'ters, *-tėrz* [AS. *fœter;* Dut. *veter;* Icel. *fjötr*, shackles, bonds—from *fet*, a footstep; *fjötra*, to hinder, to hobble a horse]: chains for the feet; anything which confines or restrains: V. to put fetters on; to restrain; to shackle; to hamper; to limit; to confine. Fet'tering, imp. Fet'tered, pp. *-tėrd*. Fet'terless, a. without fetters.

FETTLE, v. *fĕt'tl* [Icel. *fitla;* Bav. *fiseln*, to make light movements with the fingers: prov. Sw. *futtla*, to fumble with the fingers]: to set in order; to repair; to set about keenly; N. good condition; proper repair: ADJ. well adapted; well knit. FETTLING, imp. *fĕt'lĭng*. FETTLED, pp. *fĕt'ld*.

FETTSTEIN, n. *fĕt'stīn* [Ger. fat stone]: same as ELÆOLITE (q.v.).

FETUS, FETAL: see FŒTUS.

FEU. n. *fū* [Prov. *feu*, feudal tenure—from Icel. *fé;* AS. *feoh*, cattle, money, price—contr. from FEUDAL, which see]: in *Scot.*, a conditional allotment of land; a right to the use and enjoyment of lands, houses, or other heritable subjects, in perpetuity, in consideration of an annual payment in grain or money, called *feu-duty*, and certain other contingent burdens called casualties of superiority (see CASUALTY). FEU, v. to grant a perpetual right to a portion of land on which tenements may be erected, subject to an annual payment called the *feu-duty*. FEU'ING, imp. FEUED, pp. *fū'd*. FEU'AR, n. *-ėr*, one who holds land or houses on a *feu-rent.—Feu*, though referring originally to a tenure of land on condition of military service, was frequently used to express any kind of tenure by which the relation of superior and vassal was constituted; but its narrower meaning, above indicated, is that in which it is now almost exclusively used. A feu, in short, was and is a perpetual lease; and though in Scotland feus resemble English freeholds in substance, their forms agree mostly with copyhold tenure. See Paterson's *Compendium of English and Scotch Law*. The system of feuing property for building purposes, if it were freed from some entangling and burdensome incidents, seems to have several advantages over that of the long building-leases common in England and the United States. From its perpetual character, it gives to the person actually in possession a feeling of greater interest in the property, and usually leads him to erect more enduring structures. For as time runs on, the feu often increases in value, while the reverse must always be the case with leasehold property. Neither does the feu in any degree interfere with the letting of property on lease or otherwise. Almost all the houses in Edinburgh and the other towns in Scotland which are let, either on leases or from year to year, are held by those who are spoken of as their proprietors, not in absolute property, but as feus. The deed transferring the land in feu from the superior to the vassal is called a *feu-charter*—a clumsily conceived and expensive document, which, with some of its inconvenient conditions, might to advantage be set aside for some better form. For the most part, Scotch land proprietors near towns and manufacturing villages are desirous to add to their annual rental by feuing grounds for building purposes. The rate of feu is very various, but whatever be the amount, it is payable by the feuar—not the tenant to whom the feuar may have let the property.

When a building consists of several floors forming distinct dwellings, the feu-duty is allocated in certain proportions among the respective proprietors; the feuar to whom the lower floor belongs usually paying most. In properties of this kind, each is responsible only for his own share. Occasionally, feu-duties are offered for sale; and as a safe investment, bring from 25 to 30 years' purchase. In such cases, the 'vassal' (old feudal term) has an opportunity of extinguishing his feudal tenure, and becoming the superior.

FEUCHTWANGER, *foicht'vang'-ĕr*, Lewis, American chemist: b. Furth, Bavaria, 1805, Jan. 11; d. 1876, June 25. He early displayed a fondness for natural science and made that study a specialty at the Jena University. In 1829 he came to New York, where he opened its first German pharmacy. He soon won a reputation as a chemist, mineralogist, and manufacturer of rare chemicals. He was the first to introduce the alloy, German silver. His works are: *Popular Treatise on Gems* (1838); *Elements of Mineralogy* (1839); *Treatise on Fermented Liquors* (1858); *Practical Treatise on Soluble or Water Glass* (1870).

FEUD, n. *fūd* [Goth. *fiathva*, enmity—from Goth. and AS. *fian*, to hate: A.S. *fæght*, seemingly another form of *fight*, allied to *foe*, and prob. to *fiend:* Ger. *fehde*, feud, quarrel: comp. Gael. *fuath*, hate]: a contention or quarrel; an inveterate quarrel between families, clans, or factions—a war waged by one of such parties, to avenge the death or other injury of one of its members.—Syn.: affray; fray; broil; contest; dispute; strife; contention; quarrel.

FEUDAL, a. *fū'dăl* [mid. L. *feudālis*, a vassal; *feudum*, applied to the property in land distributed to his companions in arms by William the Conqueror—from Prov. *feu:* It. *feudo*, conditional allotment of land: comp. Icel. *fé*, a fee or fief; *odal*, property by allodial tenure (see Fee and Feu)]: pertaining to *feus*, or *fiefs;* pertaining to the system by which lands were held on the condition of military service. Feu'dalism, n. *-ĭzm*, the principles and constitution by which lands were held by military services (see Feudal System). Feud, or Feod, n. *fūd*, a conditional allotment of land; a fief; a fee. Feu'dalist, or Feu'dist, n. [F. *feudiste*]: one versed in feudal law. Feudality, n. *fū-dăl'-ĭ-tĭ*, state of being feudal; feudal form or constitution. Feudalize, v. *fū'dăl-īz*, to reduce to a feudal tenure. Feudalization, n. *-ā'shŭn*, act of reducing or conforming to feudalism or feudal tenure. Feu'dary, a. *-dėr-ĭ*, holding land of a superior: N. one who holds lands by feudal service. Feu'datory, n. *-dă-tėr-ĭ*, a tenant or vassal who holds his lands of a superior on the condition of military service: Adj. holding from another on certain conditions. *Note*—All such terms as *fee, fief, feu, feudal*, etc., had their origin in primitive and pastoral ages, when cattle implied wealth and money, and payments were made in kind or cattle. These and similar terms are accordingly derived from the general names for cattle—thus L. *pecūnĭă*, money—from *pĕcŭs*, cattle: Gael. *feudail*, cattle, herds: Goth. *faihu*, possessions.

FEU'DAL SYS'TEM: principles or social constitution, by which lands were held on condition of military service. By some, the word feu or feud, of which feudal is the adjective, is derived from the Lat. *fides*, faith, and *ead* or *odh*, or *od*, a Teutonic word signifying a property, or estate, in land; while others, with greater probability, maintain that the first syllable also is Teutonic, equivalent to *vieh*, cattle, ultimately from the same root with the Latin *pecus*, which in the form of pecunia, came to signify property, and its representative, money—because, as Varro remarks, property among pastoral nations consisted of cattle (Varr., *De Lingua Latinia*, 5, 19, s. 95, ed. Mull). See FEUDAL.—*Note.* A feudum, in this sense, would be a piece of land held for a *fee*, or pecuniary consideration, using pecuniary in a wide sense which its etymology suggests. Be this as it may, the feudal system, as a developed institution, belonged neither to the Teutonic nor to the Romanic nations, in their original and unmixed condition. We find it neither in the woods of Germany, nor in the Roman empire previous to the incursions of the Franks and Lombards. Neither the institutions described by Tacitus, nor those with which the Roman jurists have rendered us familiar, exhibit anything analogous to it as a whole. But they each exhibit partial indications of some of the characteristics which peculiarly distinguish it; and as it arose about the beginning of the 9th c., just when the fusion between the conquering barbarians and the subject populations of the Romanized provinces was everywhere taking place, it seems impossible to doubt that it was a result of the mutual influence of the two races. The subordination of class to class, and the intimate relations by which all the classes of the community were bound together. together with the independence and equality of the individual members of each class within itself, were among the prominent features of the simple society of the Teutonic nations; and these correspond with wonderful accuracy to the relations of superior and vassal, beginning with the sovereign and descending to the smallast feudal proprietor, and also with the equality among *peers*, which existed within each of the feudal classes. On the other hand, the incomplete and fiduciary character of the proprietorship implied in a *feu*, as held in trust from a superior on the faith of services to be rendered, or dues to be paid, bore a very close analogy to the Roman emphyteusis (from which indeed the word feu has often been derived), and to the *dominium utile* as opposed to the *dominium directum*: see DOMINIUM: EMPHYTEUSIS.

The nature of this very important social institution, by which the life of every European people of any importance was governed from the beginning of the 9th till the close of the 13th c., and by which many of the forms of our modern life are still affected, will probably be more clearly understood if its examination be begun from below, by exhibiting the position of the simple land-holder, than by beginning with the monarch in whom it culminated, and from whom, in a technical sense, it was supposed to

flow (see ALLODIUM). The latter course has been more strictly adhered to by English writers, from the fact that, subsequent to the Conquest, the whole territory of England was regarded as the property of the conqueror, and was by him divided among his barons, and by them among their dependents, an arrangement somewhat peculiar to England (see ALLODIAL), whereas the feudal system in its essentials was common to the whole of Europe. A feudal proprietor, then, or feudatory, was a person who held his lands from another for his own lifetime merely, in the earlier times, on condition of certain services which he was to perform to a superior or suzerain. Apart from the duties to which he was thus bound, he was not only a free man, but his position was that almost of an independent sovereign within his own small dominions. If his holding was extensive, he lived in a castle, which, notwithstanding the efforts of Charlemagne and his successors to prevent it, was generally fortified, not only for defense, but to enable him to pursue that life of rapine which in lawless times was not considered inconsistent with honesty or personal worth. For greater security, the castle was generally situated on a height, and under its walls there nestled a village, in which all the dependents of the proprietor with the exception of his immediate family, and all those who lived by the cultivation of the soil, usually dwelt—isolated farmhouses and cottages being too much exposed to plunder to admit of their being scattered over the country then. A portion of the inhabitants of each feudal domain were usually bound to the soil, and were thus subject to a species of slavery or serfdom, the conditions of which varied according to the cusoms of different districts. These were spoken of as *adscripii* or *adscriptitii glebæ*, and were called *nativi*, or bondmen, and *villein-socmen*, as opposed to free-socmen on the one hand, and serfs or *theowes* on the other, whose position is noted below. (Stephen's *Com.* i. p. 188). 'He was,' says Sir Francis Palgrave, speaking of the ceorl, 'a villain appurtenant; and, notwithstanding the language which was employed (to the effect, namely, that he could be bequeathed, bought, and sold), it must be understood that the gift, the bequest, or the sale, was in effect the disposition of the land and of the ceorl, and of the services which the ceorl performed for the land, a transaction widely differing from the transfer of a slave, whose person is the subject of the purchase.' (*Rise and Progress of the English Commonwealth*, I. 18). The ceorl, moreover, could purchase his own freedom and that of his wife and offspring (*Ib.*). See VILLEIN. The rest were free tenants, farmers in the modern English (not American) sense, though personal services to the proprietor probably in almost every case constituted a portion of the rent which was paid: see FARMER. Latterly, when the system of subinfeudation was introduced, many of the baron's wealthier tenants came to stand to him as the lord of the domain, very much in the relation described below as subsisting between him and his lord paramount. From being tenants at-will, scarce-

ly less subject to his authority and exposed to his caprices than the thralls, or villeins of the lowest class, they became vassals of their lord, and free citizens of what thus gradually developed itself into a feudal monarchy in miniature. The tenure by which this latter class held their lands was generally known in England as Free Socage (Stephen's *ut sup.* i. 205 *et seq.*). The castles by which the banks of the Rhine are studded from Bonn to Bingen, with their villages and parish churches, for the most part in the condition in which they were erected centuries ago, afford numerous and perfect examples of the arrangements of the feudal period. The possessors of these castles stood in a magisterial as well as a proprietary relation to their dependents. They exercised jurisdiction, extending even to the infliction of capital punishment, either in person or by means of officers whom they appointed for the purpose; and the castle was in general furnished with dungeons and other appliances for carrying their sentences into execution. Toward each other they stood in the relation of equals, or peers (Lat. *pares*); they were neighbors, simply, and friends or enemies at the case might be—too often the latter. But toward their immediate feudal superior, the count, marquis, duke, or whatever might be his title, to whom the government of the whole district belonged, they all stood in a relation which brought them in contact, and in some degree bound them to each other. Of him they held their lands on conditions somewhat similar to those on which they let them out to their own dependents. At first they were only tenants for life; but their rights in most countries very early assumed a hereditary character, the dominant proprietor's rights, on the death of atenant, being confined to the exaction of certain dues from his son and successor, as a consideration for conferring on him, or rather for confirming to him, the feu which his father had held. Where the feu, fief or feoff, as it was sometimes called from the mode of admission—feoffment—in Scotland, infeftment (q.v.)—descended to a female, the dominant proprietor was entitled to control her marriage, for the purpose of procuring himself a sufficient and trustworthy vassal; a privilege which, like all those of the lord, was latteely converted into a mere pecuniary claim. When the lord paramount, or suzerain, as he was called, held his court of justice, his vassal barons were the judges, being all on a footing of equality, or *pares curiæ*, as it was called. When he made war, either on his own account, or as furnishing a contingent to the army of the state, in such cases as in the national wars between France and England in the 12th and 13th c.—the earliest modern European instances of really national wars—his vassals were bound to attend him in person, and to furnish each the contribution of men, horses, arms, and other materials of war for which he was liable by the tenure on which he held his lands. In addition to these services, he was bound to watch and ward his castle, a duty which the minor barons almost invariably imposed on their vassals when the system of granting feus extended downward to the class of persons who had

formerly been mere tenants-at-will. Then there were certain dues almost always exigible from the vassal, such as contributions toward providing a ransom for his lord when in captivity, for enabling him to celebrate the marriage of his eldest son with due pomp, or to provide a suitable dowry for his daughter. If these dues were not paid, the land reverted to the dominant proprietor, in relation to whom the vassal all along was a mere usufructuary. So far were the conditions of feudal holdings from being always the same, that no less than 80 different tenures have been enumerated; the onerous character of which varied from what was merely nominal, e. g., the payment of a white rose or a pair of spurs, 'if asked merely,' up to what was a rent in some degree corresponding to the value of the land. For an account of the manner in which the feudal system affected the constitution of land rights and the conveyance of landed property, and still affects them, see CONVEYANCING.

Inferior to all the classes of society in feudal Europe of which we have hitherto spoken, there is reason to believe that there existed almost everywhere, in the earlier times, a class of the positively unfree. The lot of those who were in absolute slavery excluded them from the influences of feudality as a legal and social institution—'they were not reckoned,' says Palgrave, 'among the people'—but their existence is by no means to be left out of account, in forming to ourselves a picture of European society in feudal times. Of the condition of this class, as forming the substratum of feudal society, a conception may be drawn from the following passage, in which Lappenberg describes them in Anglo-Saxon times, if we bear in mind, on the one hand, that subsequently to the Conquest their ranks were probably swelled by those of the Anglo-Saxon population who were in absolute poverty; and on the other, that their position, in all the countries of Europe was gradually ameliorated by the influences of Christianity, the spirit if not the letter of which has everywhere proved hostile to slavery. 'One class of the Anglo-Saxon population, at the period of the Norman Conquest, consisted of the unfree or servile (*theowas, esnas*), whose number, as registered in Domesday book, was little more than 25,000. Of these, the majority were in a state of slavery by birth, whose forefathers had been either Roman slaves, British prisoners of war, or other enemies. Others, denominated, *wite-theowas*, or penal slaves, had been freemen, but reduced by the sentence of the law to the servile condition, on account of debt or delinquency. (Palgrave *ut sup.* i. 28.) The master had the right of selling the theow in the country, but not beyond the sea, even if he had perpetrated crime. In other respects, the condition of the servile seems to have differed little from that of the indigent free slaves who had a special wergild, half of which fell to the master and half to the kin.' (Thorpe's Lappenberg, ii. p. 320.) It is probable that the vast majority of the servile class in Anglo-Saxon, and even in Norman times, consisted of persons of Celtic blood. (Palgrave *ut sup.* p. 26.) In proof of this fact, Lappenberg remarks that their

numbers diminish as we recede from the Welsh border and from Cornwall, the places in which the Celtic or original British population is known to have taken refuge.

The social elements which counteracted and mitigated the influences of feudality in mediæval life, were monarchy, the church, which vigorously promoted the emancipation of the unfree, and above all, the growing wealth, power, and importance of the commons. In order to free himself from the rude and insolent dictation of his great feudal vassals, the barons, the king in almost every European state, courted the alliance of the town communities, who had remained more in the condition in which they had been left by the Romans than the inhabitants of the country, and who were consequently all along more or less opposed to the growth and influences of feudality: see MUNICIPIUM, By their aid, even before the formation of standing armies, something approaching to executive power was placed in the hands of the sovereign. He was thus enabled to appoint and enforce the decrees of independent judges of his own, who in the earlier time were generally churchmen, and thus greatly to circumscribe the power and influence of all classes of feudal proprietors over their dependents. Though the period of bloom of the feudal system was from the 9th to the 13th c., in most of the countries of Europe it everywhere, in many of its features, long survived the latter period. Even considered as a social, and not merely as a legal institution, in which latter capacity it still exists, it was in many respects in vigor in Scotland till 1747, when military tenures were abolished by statute, as dangerous to public tranquillity.

FEU-DE-JOIE, n. *fō'dĕ-zhwâ* [F. fire of joy]: a 'running fire' of guns on any joyful occasion, the soldiers being drawn up in lines in open order—the men, beginning at the right, fire upward, one at a time, in regular succession at scarcely perceptible intervals along the whole lines, repeated three times, and followed by three cheers.

FEU'ERBACH, LUDWIG ANDREAS: German philosopher: 1804, July 28—1872, Sep. 13; b. Anspach; fourth son of Paul Johann Anselm, Ritter von F. After studying theology two years at Heidelberg under Paulus and Daub, in 1824 he was attracted to Berlin to hear Hegel, and soon abandoned theology for philosophy. In 1828 he became *privatdocent* in the Univ. of Erlangen, but in a few years quitted the academical chair, and gave his whole time to literary labor. In a small anonymous work (*Gedanken über Tod und Unsterblichkeit*, Nürnberg 1830), which attracted little attention when it appeared, he indicated that he had already gone beyond his master Hegel, by combating the doctrine of immortality. During the next few years, he published three works on portions of the history of philosophy, treating severally of the period between Bacon and Spinoza, of Leibnitz and of Pierre Bayle. But these historical works only paved the way to a critical investigation into the nature of religion and its relation to philosophy, the results of which have been given to the world in several works well known to speculative theologians. The most celebrated is

his work on the Nature of Christianity (*Das Wesen des Christenthums*, Leip. 1841; 2 Aufl. 1843), translated into English. Starting from the Hegelian doctrine, that the Absolute comes to consciousness only in humanity, F. denies to the Absolute any existence beyond the human consciousness, maintaining it to be merely the projection by man of his own ideal into the objective world on which he feels his dependence. All authority above man, and consequently all moral obligation, is therefore consistently regarded as a delusion proceeding from man himself—which, if a fact, involves the conclusion that man's constant nature is itself a delusion—and the highest good is explained as that which is on the whole most pleasurable. Yet even this highest good is further explained as consisting in resemblance to that ideal humanity which man creates for himself and worships as God. A kind of ideal and unreal theism is thus retained by F.; but when his doctrines were adopted by the mass of German communists, they degenerated, perhaps logically, into an actual atheism, which ignored any moral or social law imposed on the individual from any other source than himself.—The works of F. have been collected, with additions and corrections to bring them into accordance with his later views (*F.'s Sämmtliche Werke*, 10 Bde., Leip. 1846-66). See Karl Grün's *Ludwig F.* (1874), and Beyer's *Leben und Geist F.'s* (1873).

FEUERBACH, *foy'ĕr-bâch*, Paul Johann Anselm, Ritter von: one of the most distinguished criminal jurists of Germany: 1775, Nov. 14—1833, May 25: b. Jena. Brought up at Frankfurt-on-the-Main, where his father was an advocate, and educated in the gymnasium there, he went 1792 to Jena, and then applied himself to positive law. In 1798 he appeared as criminal jurist in a work *On the Crime of High Treason*, and in the following year he began to deliver lectures in the Univ. of Jena. In his lectures and published writings, he introduced into criminal jurisprudence a new method of treatment, which was systematized in his Compendium of German Penal Law (*Lehrbuch des Gemeinen, in Deutschland geltenden peinlichen Privatrechts*, Giessen 1801; 14 Aufl. von Mittermaier 1847). This celebrated work placed F. at the head of a new school of jurists, who maintain that the decision of the judge in every case ought to be determined solely by an express deliverance of the penal law, never by his own discretion, and who on that account obtained the name of Rigorists. In 1801 F. was appointed ordinary prof. in Jena, but 1802 accepted a call to Kiel. In 1804 he was removed to the Univ. of Landshut; but next year, having received a commission to prepare a penal code for Bavaria, he was transferred to Munich as privy referendary for the ministerial, judicial, and police departments; and 1808 was appointed privy-councilor. The new penal code which he planned for Bavaria (*Strafgesetzbuch für das Königreich Baiern*, München 1813), received, after a few modifications, the royal approval, and was taken as a basis in the emendation of the criminal law of several other countries. During this period he published Remarkable Cases in Criminal

Law (*Merkwürdige Criminalrechtsfälle*, 2 Bde, Giessen 1808-11), which led the way to a deeper psychological treatment of such cases. In 1812, he published a work on Trial by Jury, to which a second vol., on the Judical Procedure of France, was added 1825, as the result of a visit to Paris 1821. In 1817 he became second pres. of the court of appeal in Bamberg, and afterward first pres. of the court of appeal at Anspach for the Rezat district. In 1832 he published a work on the unfortunate Kaspar Hauser, whose mysterious fate had strongly attracted his interest. He had just edited a collection of his miscellaneous writings, when he died at Frankfurt-on-the-Maine. An interesting life of Feuerbach has been written by his son Ludwig (*Leben und Wirken Anselm von Feuerbachs*, 2 Bde. Leip. 1852). Feuerbach left three daughters and five sons, who have distinguished themselves in German literature.

FEUILLANS, *fėh-yângz*, CONGREGATION OF: a reform of the Cistercian order, remarkable as forming part of the great religious movement in the Rom. Cath. Church during the 16th c., contemporary with and probably stimulated by the Reformation. The author of this reform was Jean de la Barriere, abbot of the Cistercian monastery of Feuillans, who, painfully struck by the relaxation of its discipline, laid down for himself a new and much more austere course of life, in which he soon found many imitators and associates among the brethren of his order. The rule thus reformed was, after considerable opposition from the advocates of the old rule, approved, with certain modifications, by Pope Sixtus V.; the reformed congregation, however, being, still left subject to the authority of the abbot of Citeaux; and a convent was founded for them by Henry III. in the Rue St. Honoré, Paris. The subjection to the abbot of Citeaux was removed by Clement VIII. 1595; and Urban VII. 1630, separated the congregation into two branches, one for France, the other for Italy, each under a distinct general. The rules of both these branches were subsequently modified about the middle of the same century.

FEUILLANTS, *fė-yângz:* celebrated revolutionary club named from the order of the Feuillans (q.v.), whose convent in the Rue St. Honoré was the place of meeting for the club. It was founded 1790 by Lafayette, Sièyes, Larochefoucauld, and others holding moderate opinions. The club, at first called the 'Company of 1789', was intended to support the constitution against the ultra party. It reckoned among its members individuals of all classes, who took the constitution of England as their model. This opposition served, however, only to accelerate the revolutionary movement. 1791, Jan. 27, on Count Clermont Tonnerre being elected pres. of the club, a popular insurrection broke out against it; and the assembly in the cloister was forcibly dispersed by a raging mob.

FEUILLEA: *fū-ĭl'ē-a:* genus of plants of the nat. ord. *Cucurbitaceæ*, name in honor of Louis Feuillée, French

botanist and traveller in Chili. The species are generally half-shrubby climbers, natives of the warm parts of America. The seeds, at least of some, as *F. cordifolia* and *F. trilobata*, contain a great quantity of a bitter fixed oil, obtained by expression, and used for lamps. It has high reputation in the W. Indies and Brazil, as a cure for serpent-bites, and an antidote to some vegetable poisons.

FEUILLET, *fėh-yā'*, OCTAVE: 1812, Aug. 11—1890, Dec. 30; b. Saint-Lô, France: author. Educated at the College of Louis-le-Grand, he became literary assistant to the elder Dumas; began his own literary career under the pen name of Désiré Hazard 1844; was elected to the French Acad. 1862; appointed an officer of the Legion of Honor 1863; and was for several years librarian of the imperial residences. He was a frequent contributor to the newspapers and reviews; wrote many comedies, dramas, and farces; and exhibited excellent gifts as a writer of fiction. His publications include *Polichinelle* (1846); *Onesta* (1848); *La Rédemption* (1849); *Bellah* (1850); *Le Cheveu Blanc* (1853); *La Petite Comtesse* (1856); *Le Roman d'un Jeune Homme pauvre* (1858); *Sibylle* (1862); *Monsieur de Camors* (1867); *Julia de Trécœur* (1872); *Un Mariage dans le Monde* (1875); *Les Amours de Philippe* (1877); *Le Journal d'une Femme* (1878); *L'Histoire d'une Parisienne* (1881); *La Veuve;* and *La Morte* (1886).

FEUILLETON, *fô'ĭ-tŏng* [F. a small leaf—from *feuille*, a leaf]: in France, that portion of a political newspaper set apart for criticisms on art, literature, etc., usually separated from the main sheet by a line. The Feuilleton is an invention of the *Journal des Débats*, which, since 1800, has held an important place in the sphere of literary criticism. By degrees, the belles-lettres element began to pervade it; and the result was a species of light journalistic literature, in which Jules Janin became the acknowledged king. In the years immediately preceding the revolution, 1848, Feb., entire romances were spun out in the feuilleton. The *Constitutionnel*, in particular, made large pecuniary profits by the social romances of Eugene Sue, which it published in this manner. The French system has been imitated in England and Germany, though with less success than in France.

FEUTER, or FEWTER, v. *fū'tėr* [OF. *feutrer*, to cover with, to pad]: in *OE.*, to make ready; to fix in a rest FEU'TERING, imp. FEU'TERED, pp. *-tėrd.*

FEUTERER, n. *fū'tėr-ėr* [OF. *vaultre*, a boar-hound]: in *OE.*, a dog-keeper; the man who lets the dogs loose from the slips.

FEVEDA, *fēv'da:* island of British Columbia, in the Gulf of Georgia, between Vancouver Island and the continent; lat. 49° 41′ n., and long. 124° w.; 32 m. in length by 2 in average breadth. It possesses a snug little harbor, which has additional value from the superior quality of the fuel which abounds on the shores. The island is understood to be wholly of limestone.

FEVER, n. *fē'vėr* [F. *fièvre;* OF. *fevre*—from L. *febris*, a fever—from the notion of shivering: Bav. *fibern*, to tremble with anger or desire]: a disease marked by a quickened pulse, an increase of heat, great thirst, etc.; agitation; excitement: V. to put into a fever. FE'VERING, imp. FEVERED, pp. *fē'vėrd.* FE'VERISH, a. having a slight fever; hot. FE'VERISHLY, ad. *-lĭ.* FE'VERISHNESS, n. the state of being feverish; mental restlessness. FEVER-FEW, n. *-fū* [L. *febrĭfŭgă*—from *fŭgārĕ*, to put to flight]: an herb like the ox-eye daisy. FEVER'ROOT: same as FEVER-WORT (q.v.). FEVER-TREE, n. the blue gum-tree, *Eucalyptus globulus.* FEVER-WEED, n. plant of the genus *Eryngium* (see below).

FE'VER [Lat. *fēbris*, from *ferveō*, I grow warm, or perhaps from *februō*, I cleanse]: an increase of the temperature of the body, which, however, requires to be estimated according to the state of the internal parts, rather than the external; the surface of the body, and particularly of the extremities, being frequently cold rather than warm. Having regard to the heat of the surface only, fever has commonly been considered as passing through three distinct stages, more or less marked: 1, the cold or shivering stage; 2, the hot stage; 3, the sweating stage. This description is correct, but must be qualified by the remark, that even in the cold stage of fever, it is now well ascertained that the blood and the internal organs have an elevated temperature, as estimated by the thermometer introduced into the cavities of the body. In the cold stage of fever, accordingly, and even in the most violent ague, when the teeth are chattering with cold, and the whole surface is pale and clammy, the state of the system is well expressed by the aphorism of Virchow, to the effect that 'the outer parts freeze while the inner burn'. Increased heat of the body, therefore, is the only essential phenomenon of fever. Other symptoms accompanying an elevation of the body temperature are loss of appetite, thirst, restlessness, and vague general uneasiness, often headache, and diffused pains in the back and limbs; a frequent pulse which is sometimes full and hard; a furred tongue, often with red margin; a flushed face and suffused eyes. The disease often commences with a shivering, or rigor as it is technically called; this leads through the cold stage to the hot, which usually follows rapidly, and is attended by all the febrile phenomena in their highest degree; the skin being often hot to the hand, dry, and harsh; by and by, moisture begins to bedew the surface, and the pungent heat disappears: the disease is then about to pass into its third or sweating stage, which ushers in convalescence. This is a picture of a malarial paroxysm which may be regarded as typical of the febrile process. For the special symptoms of particular fevers, see these fevers under their respective titles.

Besides being the leading fact in a number of specific diseases, fever is also associated with many other forms of disease as a secondary or subordinate phenomenon, con-

nected with inflammation or other distinctly local condition. Thus, in pneumonia or enteritis, fever is as much a part of the symptoms as pain or any other; and even in some chronic or long-standing diseases as in tuberculosis, a slow type of fever (see HECTIC FEVER) is very generally present. Fever was also very generally prevalent after surgical operations and injuries, of which it constituted one of the leading dangers in the days preceding the use of antiseptics or aseptics. Fevers are distinguished also with reference to their mode of diffusion, as Epidemic (q.v.) and Endemic (q.v.); or with reference to their supposed cause, as contagious, infectious, malarious, etc.; or with reference to their incidental symptoms and their peculiarities of course and termination (the presumed *specific* phenomena attracting, of course, particular attention), as eruptive (see EXANTHEMA) or non-eruptive, bilious, gastric, enteric, mucous, putrid, malignant, typhoid, etc.

The true pathology, or ultimate essence of the febrile state, is still open to question; but it is in accordance with modern physiology to regard fever as connected with some complex derangement of the metabolic changes, due to the toxic action of the bacteria of the disease of which the fever is a symptom. Some investigators have been led by the GERM-THEORY (q.v.) to regard some of the specific fevers as parasitic diseases.

For the treatment of fever, see the several titles above referred to.

FEVERFEW, (*Leucanthemum parthenium*): perennial plant of the *Tubuliflorœ* of the nat. ord. *Compositœ*, growing in waste places and near hedges. It is botanically allied to Chamomile (q.v.), and still more nearly to Wild Chamomile (*Matricaria chamomilla*), and much resembles these plants in its properties, but differs in appearance, the segments of its leaves being flat and comparatively broad, and its flowers smaller. Its habit of growth is erect, its stem much branched, and about 1—2 ft. high. It has a strong, somewhat aromatic smell. It was formerly a popular remedy in ague, and from time immemorial has been used as an emmenagogue. It is employed in infusion, and is stimulant and tonic. A double variety is not uncommon in gardens. It has escaped from gardens in the United States, in some places. Of the same genus is our showy but troublesome Ox-eye Daisy (*L. vulgare*), naturalized from Europe. The name Leucanthemum means white flower.

FE'VERWORT (*Triosteum perfoliatum*): perrennial plant of the nat. ord. *Caprifoliaceœ*, having an erect, hairy, fistular stem, 1-4 ft. high, opposite ovato-lanceolate entire leaves, axilliary whorls of flowers, with tubular 5-lobed coralla, and leathery 3-seeded berries. It is a native of N. America, where its dried and roasted berries have been occasionally used as a substitute for coffee, but it is valued chiefly for its medicinal properties, its root acting as an emetic and mild cathartic. It is sometimes called

Tinkar's Root, from Dr. Tinkar, who first brought it into notice.

FEW, n. *fū* [Goth. *favs;* AS. *feawa;* Icel. *fár;* L. *paucus,* little, few]: not many; small in number. FEW'ER, comp. FEW'EST, sup. FEW'NESS, n. smallness of number. IN FEW, in *OE.,* with few words; in brief terms.

FEW, WILLIAM: 1748, June 8—1828, July 16; b. Baltimore co., Md.: legislator. He received a thorough education, was admitted to the bar, and removed to Augusta, Ga., to practice, 1776. The same year he was chosen a member of the assembly and a delegate to the convention to frame a constitution, and became a member of the council. He served through the revolutionary war as col., became surveyor-gen., and presiding judge of the Richmond co. court 1778, was a representative in the continental congress 1780–83, a member of the federal constitutional convention, 1787, and one of the first two U. S. senators from Ga. 1789–93. During 1794–97 he was judge of the state circuit court. He removed to New York 1799, July, was in the legislature 1802–05, and was afterward commissioner of loans and mayor.

FEY, a. *fa* [AS. *fæge,* doomed to die: Icel. *feigr,* destined to die: Dut. *veeg,* about to die: F. *fée,* a fairy]: in *Scot.* and *OE.,* in the power of the fates; doomed; fated.

FEZ, n. *fĕz:* in *Turkey,* red cap without a brim, worn by men; a smoking-cap.

FEZ, *fĕz* (Ar. *Fas*): chief and most northerly province of the empire of Morocco; between the Atlas Mountains and the Mediterranean. It is divided into 15 districts. Pop. (Berbers, Moors, Arabs, Negroes, Jews, and a few Europeans) estimated abt. 3,200,000.

FEZ: capital of the province of Fez; lat. 34° 6′ N., and long. about 5° 0′ W.; founded by Muley Edris II., 808, and reckoned during the middle ages—when it was cap. of the kingdom of Morocco—one of the most magnificent and largest cities in the Mohammedan world. It is said to have contained about 90,000 dwelling-houses, and about 700 mosques, and was celebrated for its splendid public buildings, schools, and scientific institutions. On the removal of the court to Morocco, about the middle of the 16th c., Fez gradually fell into decay. It is still, however, a place of importance. The situation of Fez is singular; it lies in a valley, formed by surrounding hills into a sort of funnel, the higher parts of which are covered with trees, orange groves, and orchards. It is divided into Old and New Fez by one of the upper branches of the Sebu. There are 100 mosques, of which the most important is that built by the Sultan Muley Edris, which contains his monument, and is an inviolable refuge for criminals, however guilty. On account of its numerous mosques and relics, it is regarded as the Holy City of the western Arabs. It has seven well-attended schools. The old palace of the sultan is large, but is now falling into decay. In other respects, the external aspect of Fez, with its numerous baths, caravanseras

(of which there are about 200), and bazaars, resembles that of Mohammedan towns in general; the multitude of hotels and shops alone imparting to it a more European character. Considerable trade is still carried on, by caravans, with the adjoining countries on the s. and e. extending as far as Timbuctoo. During the period of anarchy in Morocco, 1902–3, Fez was frequently the scene of bloodshed and was at alternate times held by the Sultan and the pretender. Pop. estimated from 100,000 to 150,000.

FEZZAN, *fėz-zān'* (correctly FESSAN): extensive oasis in the n. of Africa; s. of the regency of Tripoli. 24°–31° n. lat., and 12°–18° e. long. The north is for the most part hills, but the hills are composed of perfectly bare, black quartz sandstone, with no rivers or brooks among them, and the south is mainly a level waste of dry sand. Not more than a tenth of the soil is cultivable. In the neighborhood of the villages, which are mainly in the wadies, wheat, barley, etc., are cultivated. Camels and horses are reared in considerable numbers. Lions, leopards, hyenas, jackals, wild-cats, porcupines, vultures, ostriches, buzzards, etc., abound. The inhabitants are a mixed race, of brown color, in many respects resembling the negroes, but generally well formed. The original inhabitants belonged to the *Berber* family, but since the invasion of the country by the Arabs in the 15th c., the traces of this native N. African element have gradually become very faint. The language spoken is a corrupt mixture of Berber and Arabic. The people are far behind in civilization, and occupy themselves with gardening and the manufacture of the most indispensable necessaries of life. Considerable trade is carried on by caravans between the interior of Africa and the coast. Fezzan is the Phazania of the ancients, against which the Romans, under Cornelius Balbus, undertook a campaign about B.C. 20. During the classic period, as well as in the middle ages, it was governed by its own princes who were at first independent, but afterward became tributary to the pashas of Tripoli. In 1842, Fezzan was conquered by the Turks, and is now attached to the govt. of Tripoli. Pop. estimated 75,000 to 150,000.

MURZUK, cap. of Fezzan, is a well-built town with broad streets. Merchandize valued more than $100,000, £21,000, annually changes hands here, but of that amount the slave-trade supplies seven-eighths. Murzuk is now the great starting-point from the n. for the interior of Negroland. Pop. 3,000.

Compare Barth's *Travels in Central Africa* (Lond. 1857), also the descriptions given of Fezzân by Denham, Clapperton, Oudney, Richardson, Dr. Vogel, etc.

FIACRE, n. *fē-ăk'r* [F. *fiacre*]: a hackney-coach; a hackney-coachman. The name is from St. Fiacre, anchorite of the 7th c., reputed son of a king of Scotland, who had his abode in the forest of Breuil. After his death, pilgrimages were made to his shrine, which had the repute of working miracles; and the demand for vehicles for this

purpose caused the name Fiacre to be given to coaches for hire.

FIANCÉ, n. *fē′ăṅġ-sā′* [F. *fiancé*, masc. *fiancēe*, fem.]: betrothed; a person affianced. FIANCÉE, n. fem. *fē′ăng-sā′*.

FIARS, n. plu. *fē′ėrz* or *fī′ėrz* [Icel. *fė;* AS. *feoh*, cattle, price—connected with *fee, fief, feudal* (see FEUDAL). *Note.*—FIARS is intimately connected with the OE. AFFEER, which see]: in *Scotland* the average prices of the different kinds of grain of the growth of each county for the preceding crop, as fixed by the sentence of the sheriff, proceeding on the report of a jury summoned for the purpose, before whom the evidence of farmers and grain-dealers is produced. The values thus officially ascertained serve as a rule for ascertaining the prices of grain in all contracts where they are not fixed by the parties; and in many sales it is agreed to accept the rates fixed by the fiars. Ministers' stipends, also certain rents, so far as they consist of grain, and crown dues, are paid by the fiars prices of the county for each year. With a view to the latter, fiars, in former times, were struck in exchequer.—In England, weekly averages of *all* grain sold at public markets are ascertained and published in the *Gazette*, and this is without respect to the produce of particular counties.—See *Historical Account of the Striking of the Fiars in Scotland*, by George Paterson, Esq., Advocate, 1852.

FIASCO, n. *fē-ăs′kō* [It. *fiasco*, a flask or bottle, a failure]: a failure of any kind. The term, borrowed from the Italian theatre, and now naturalized in France and Germany, and used occasionally by English writers, signifies primarily a failure to please on the part of an actor or singer, and is thus the opposite of *furore;* though why the word, which simply means a bottle, should come to be thus applied, is more than anybody knows. In Italy, it is not uncommon to hear an audience cry out, *'Old, old, fiasco,'* even when the singer has made only a single false note. It is suggested that *fiasco* originated from the name *Fiesco*, who conspired against the Dorias, Doges of Genoa in the 13th c., but who miserably failed; hence, any complete failure of an undertaking ushered in with high hopes.

FIAT, n. *fī′ăt* [L. *fīāt*, let it be done—from *fīō*, I am made]: a formal or solemn command; a decree; an order; in *Eng. law*, a short order or warrant of a judge for making out or allowing certain processes.

FIB, n. *fĭb* [It. *fiabbare*, to sing idle songs: OE. *fible-fable*, nonsense: perhaps adapted from *fable*]: a small lie; a falsehood: V. to tell a lie; to utter an untruth. FIB′BING, imp. FIBBED, pp. *fĭbd.* FIB′BER, n. one who lies. FIBSTER, n. *fĭb′stėr, familiarly*, a liar in a silly trifling way.

FI′BER: see MUSQUASH.

FIBRE, or FIBER, n. *fī′bėr* [F. *fibre*—from L. *fibra*, a fibre]: a strong tough thread; long stringy tissue, as wood-fibre or muscle-fibre; fine slender threads, or thread-like

substances (see below). FI′BRED, a. *-bėrd*, having threads. FI′BRELESS, a. without fibres. FI′BRIL, n. *-brĭl*, a small fibre. FIBRIL′LÆ, n. plu. *-brĭl′lē*, in *bot.*, very small and fine roots, as in the lichens. FIBRILLATION, n. *fĭb′rĭl-lā′-shŭn*, the state of being made up of fibres, or in appearance like fibrils. FIBRIL′LOSE, a. in *bot.*, covered with little strings or fibres. FIBRIL′LOUS, a. *-lŭs*, pertaining to fine fibres; formed of small fibres. FI′BROUS, a. *-brŭs*, containing fibres; thread-like; possessing a structure separable into small threads or strings. FIBROUS TISSUE: see TISSUES. FI′BROUSNESS, n. the quality or state of being fibrous. FIBRIN, or FIBRINE, n. *fī′brĭn*, a peculiar substance, found in animals and vegetables, which forms fibres and muscular flesh; the substance which forms the clot of blood (see below). FIBRINA′TION, n. *-ā′shŭn*, in *med.*, state of becoming fibrinous or having an excess of fibrin, as in inflammatory diseases. FI′BRINOUS, a. *-brĭn-ŭs*, of or like fibrin. FIBROID, a. *fī′broyd* [Gr. *eidos*, resemblance]: resembling simple fibre in structure; denoting a tumor in which the cell elements have assumed the appearance of fibres. FIBRO-CELLULAR, in *bot.*, applied to tissue composed of spiral cells. FIBRO-PLASTIC [F. *fibro-plastique*]: in *anat.*, a term applied to a morbid formation constituted of the elements of cellular tissue, transformed in part into fibre. FIBRO-VASCULAR, applied to tissues composed of mixed vessels, containing spiral and other fibres, found in all the higher plants. FIBROUS-COAL, variety of coal found in Great Britain, and distinguished by fibrous structure and silky lustre. FIBROUS-SHELLS, in *zool.*, shells of fibrous structure like the recent Pinna and the fossil Inoceramus. They consist of successive layers of prismatic cells, containing translucent carbonate of lime. *Note.*—The *fibrin* of flesh and the *gluten* of wheat are almost exactly the same thing.

FI′BRE: term of very common use as applied to objects of a stringy or thread-like character, whether animal, vegetable, or mineral. Minerals are often described as of a fibrous structure or appearance, in which there is, however, no possibility of detaching the apparent fibres from the general mass, or in which they are inflexible and brittle if detached: but a more perfect example of mineral fibre is found in *Amianthus*, a variety of ASBESTUS (q.v.). For the scientific use of fibre with regard to the animal kingdom see MUSCLE; for its scientific use with regard to the vegetable kingdom, see VEGETABLE TISSUE; WOOD AND WOODY FIBRE. In its more popular, but perfectly accurate use, fibre includes the hair or wool of quadrupeds, the silken threads of the cocoons of silk-worms and other insects, the fibres of the leaves and of the inner bark of plants, and the elongated cells or hairs connected with the seeds of plants, the ordinary materials of cordage and of textile fabrics.

Of mineral substances, amianthus alone has been used for textile fabrics, and that only to a very limited extent. Animal and vegetable fibres have, from the earliest ages,

FIBRE PLANTS.

1. Istle or Tampico Hemp.
2. Sisal Hemp.
3. Mauritius Hemp.
4. Cocoanut Plant.

supplied man with cordage and with cloth. How the invention took place can only be matter of conjecture.

The animal fibres used for textile purposes are chiefly of the two classes already mentioned—(1) the wool or hair of quadrupeds; (2) the silk of the cocoons of insects. To these may be added (3) the Byssus (q.v.) of mollusks, but this class contains only the Byssus of the PINNA (q.v.) of the Mediterranean, an article of ancient and high reputation, but more of curiosity than of use. The skins and intestines of animals, though sometimes twisted or plaited for various uses, can scarcely be reckoned among the fibrous materials afforded by the animal kingdom. For information regarding the fibres obtained from the cocoons of insects, see SILK AND SILKWORM. It is to the first class that the greater number of different kinds of animal fibre used for textile purposes belong; and the wool of the sheep far exceeds all the rest in importance: see SHEEP WOOL. But the wool or hair of other quadrupeds also is to some extent used, as of the Goat (see GOAT: ANGORA), the Alpaca (q.v.), the Camel (q.v.), the Bison (q.v.), the Musk Ox (q.v.), the Yak (q.v.), and the Chinchilla (q.v.); all of which, except the last—and it has but a doubtful claim to be mentioned —are, like the sheep, ruminants. The hair of comparatively few animals is sufficiently long for textile purposes, or can be procured in sufficient abundance to make it of economic importance. The warmth of clothing depends much on the fineness of the hair, and on other characters in which wool particularly excels.

The useful vegetable fibres are far more numerous and various than the animal. They are obtained from plants of natural orders very different from each other; none of them, however, belonging to the class of acrogenous or cryptogamous plants. They are obtained also from different parts of plants. Those which are derived from exogenous plants are either the fibres of the inner bark (or BAST, q.v.), as flax, hemp, etc.; or hairs of the fruit, as cotton, The useful fibres of endogenous plants also sometimes belong to the fruit, as coir or cocoa-nut fibre, and the unimportant fibre of cotton-grass. The spathe of some of the palms also is sometimes sufficiently fibrous and strong to be used for bags, etc., without separation of its fibres; the fibres of the interior of the stem of old cocoa-nut palms are sometimes used for coarse purposes; the fibrous character of the stems of the slender palms called rattans, of bulrushes, etc., fits them for wicker-work, for plaiting into chair-bottoms, and the like; the roots of the *Agaves* (q.v.) yield fibres useful for various purposes; but generally, the more valuable fibres obtained from endogenous plants are those of their leaves, either of the leaf-stalks—as Piassaba fibre and Gomuto or Ejoo fibre, both produced by palms—or of the blade of the leaf, as New Zealand Flax, Sisal, mauritius and Manilla magney. The fibres of the leaves of endogens being parallel to each other, are easily obtained of sufficient length for economical purposes; while

the reticulated fibres of the leaves of exogens, even if long enough, which is comparatively infrequent, cannot be separated for use. The *bast* fibres of exogens, however, are often of sufficient length, and easily separable. Their separation is accomplished generally by steeping in water or by frequent bedewing with water to cause a partial rotting of the other parts of the bast and of the bark which covers it. But the fibres of endogens being in general discolored and injured by this process to a much greater degree than those of exogens, mere mechanical means are usually preferred for their separation, such as beating, passing between rollers, and scraping. Nearly all the leaf fibres of commerce are separated by scraping alone. The fibres of *fruits*, as cotton, exist in nature in a separate state, like the wool or hair of animals, and require merely to be collected and cleaned. More than one-half of the leaf fibre of commerce is cleaned by machine at one operation from the fresh green leaf, but as yet there is no satisfactory mechanical device for cleaning bast fibres.

A complete enumeration of the kinds of vegetable fibre applied to economical purposes would not be easy. Flax, hemp, and cotton have long had pre-eminence. To these have recently been added sisal, New Zealand flax, jute, sunn or sunn hemp, coir, pita flax, abaca or manilla hemp, bowstring hemp, China grass, piassaba, and many others. New kinds are continually being brought under notice; and industrial exhibitions and industrial museums have beneficially contributed to this. The annual production of sisal (about $16,000,000) exceeds that of any other vegetable fibre except cotton. Abaca comes next as a long fibre, then flax and jute and hemp. The value of istle (about $1,500,000) exceeds that of sunn, bowstring, China grass and piassaba. For the use of vegetable fibres in the manufacture of paper, see PAPER.

FIBROUS PLANTS.—Of plants which yield fibres employed for economical purpose, the following is a list not complete, but practically useful. For many plants here enumerated, see their separate titles, or the natural orders. The most important are indicated by capitals.

I. EXOGENOUS PLANTS.

1. *Fibres of the Fruit.*

NAT. ORD. *Malvaceæ*.—COTTON, produced by species of Gossypium.
——— *Bombaceæ*. Silk-cotton, Kapok, or vegetable silk, the produce of *Ceiba pentandra*, *Bombax ceiba*, *B. malabaricum*, etc.
——— *Asclepiadaceæ*. The silk-like down of the seeds of Virginian Silk (*Asclepias Syriaca*)..

2. *Fibres of the Inner Bark or Bast.*

NAT. ORD. *Malvaceæ*. Deccane Hemp (*Hibiscus cannabinus*).—Other species of *Hibiscus*, *Althaea cannabina*, *Sida*, *Abutilon*, etc.
——— *Sterculiaceæ*. A number of species of different genera; some of them cultivated to a small extent.
——— *Tiliaceæ*. JUTE (*Corchorus olitorius*, *C. capsularis*, etc.)—The bast of some trees of this family, as the Linden or Lime (*Tilia Europaea*, etc.) and Majagua (*Paritium tiliaceum*) is used for mats, ropes, etc.; see BAST.
——— *Linaceæ*. FLAX, the produce of *Linum usitatissimum*.

——— *Leguminosæ.*—SUNN. Jubbulpore Hemp, etc., the produce of species of *Crotalaria.*
Spanish Broom (*Spartium junceum*).
Bokhara Clover (*Melilotus arborea*).
Dhunchee (*Sesbania aculeata*).
Species of *Cytisus* (as Common Broom), Butea, *Parkinsonia*, *Bauhinia*, etc.
——— *Asclepiadaceæ.* Jetee (*Marsdenia tenacissima*).
Yercum or Mudar (species of *Calotropis*).
Virginian Silk (*Asclepias Syriaca*, *A. debilis*).
Other species of several genera.
——— *Apocynaceæ.* Canadian Hemp (*Apocynum cannabinum*).
——— *Urticaceæ.* Common Nettle (*Urtica dioica*) and other species of *Urtica.*
Ramie (*Bœhmeria nioca*) yielding China grass fibre and Rhea (*B. tenacissima*).
——— *Moraceæ.* HEMP (*Cannabis sativa*).
Hop (*Humulus lupulus*).
——— The bark of some species of Fig.
——— *Coniferæ.* Inner bark and roots of some species of Pine and Fir.

II. ENDOGENOUS PLANTS.

NAT. ORD. *Liliaceæ.*
NEW ZEALAND FLAX, fibre of leaves of *Phormium tenax.*
Bowstring Hemp, fibre of leaves of species of *Sansevieria.*
Fibre of leaves of species of *Yucca.*
——— *Amaryllideæ.* SISAL fibre from leaves of Sisal (*Agave sisatana*), and henequen (*Agave rigida elongata*).
Maguey, fibre of leaves of *Agave Americana A. potosina* and *A. colina.*
——— *Mauritius* fibre from leaves of '*Aloes vert*' *Furcraca fœtida.*
——— *Musaceæ.* ABACA or Manilla Hemp from sheathing leaf stems of Abaca, (*Musa textilis*). Plantain fibre from leaf stems of plantain (*Musa paradisiaca*).
——— *Bromeliaceæ.* Pine-apple Fibre, Curratow, etc., fibres of leaves of species of *Bromelia*, etc.
——— *Pandanaceæ.* Fibres of leaves of Screw-pines.
——— *Palmaceæ.* COIR or cocoa-nut fibre, from husk of cocoa-nut. Fibre of cocoa-nut stem. Gomuto or Ejoo fibre, from leaf-stalks of Gomuto Palm (*Arenga saccharifera*). Raffia epidermis of leaves of raffia palm (*Raphia ruffia*).
Piassaba, from *Attalea funifera* and *Leopoldinia Piassaba* (the Chiquichiqui Palm).
Other fibres from leaf-stalks, etc., of many palms.
——— *Cyperaceæ.* Fibre from leaves of *Eriophorum cannabinium* (see COTTON-GRASS). Mats, chair-bottoms, etc., made of different *Cyperaceæ.*
——— *Gramineæ* or Grasses. Esparto (*Stipa tenacissima*).
Moonja (*Saccharum munja*).

FI'BRIN, or FIBRINE: an organic compound, occurring in animals and plants. In chemical composition it closely resembles albumen and caseine, and it was until recently believed that these three substances possessed a common radical, to which the name *proteine* was given, the proteine being regarded as the primary basis of all the tissues, of the body. Hence we frequently find fibrin described as one of the proteine bodies.

Fibrin is distinguished from the allied substances, albumen and caseine, by its separation in a solid state, in the form of extremely delicate filaments or lamellæ, from any fluid in which it is dissolved, very shortly after the fluid is taken from the organism. Animal fibrin, which is of great physiological importance, occurs principally in the blood, the lymph, and the chyle. It results from the union of two albuminoids, fibrinogen,

and fibrinoplastic substances, which exist separately in the blood. To obtain fibrin, beat or stir the blood with a bundle of twigs, to which the fibrin adheres in strings. The impure fibrin thus obtained is then rinsed with water, boiled with alcohol and ether,—to remove fatty matters—and dried. In healthful venous blood, it scarcely ever amounts to 3 in 1,000 parts, its average quantity being 2.3. Small, however, as its amount is, it varies more than any other constituent of the blood—and in acute inflammatory diseases sometimes exceeds its average by five or six times. Moreover, arterial blood contains more fibrin than venous blood. In the lymph and chyle, it occurs in considerably less quantity than in the blood. In inflammatory exudations, we find fibrin in the contents of the serous cavities—for example, of the pleura and peritoneum—and on the mucous membrane (as in croup); in these cases, it occurs usually in a state of spontaneous coagulation. There are good physiological reasons for believing that fibrin is formed from albumen, and not directly from the food; and as fibrin contains a little more oxygen than albumen, it has been inferred that it is formed from the latter by a process of oxidation. As, however, more fibrin is found in the blood in pneumonia—when a considerable portion of the lungs is rendered impervious to air—than in almost any other disease, we are inclined to adopt the opposite hypothesis, that the augmentation of the fibrin in inflammatory blood is caused by an insufficient supply of oxygen. When oxygen is abundantly introduced into the blood, the fibrin rapidly undergoes further transformations: on the other hand, when, in consequence of impeded respiration, the quantity of oxygen conveyed to the blood is not sufficient to effect the further normal oxidation or transformation of the fibrin, we have an accumulation of that constituent in the circulating fluid. It has, however, been a disputed question, whether fibrin is produced in the elaboration or in the disintegration of the tissues. For the discussion of this subject, and of other points connected with fibrin, see any standard work on Physiological Chemistry.

The substance forming the mass of flesh or muscular tissue was formerly regarded as identical with coagulated blood-fibrine. The two substances are, however, chemically distinct, and the muscle-fibrin will be described under its new chemical name, SYNTONIN (from *sunteinein*, to contract or render tense.

FIBRINOGEN, n. *fī-brĭn′o-jĕn* [Eng. *fibrin*, and Gr. *gennăō*, I produce]: a soluble globulin in the blood plasma, by the coagulation of which fibrin is produced. This coagulation is probably induced by an enzyme, or ferment, called thrombin.

FIBRINOPLASTIC, a. *fī′′brĭn-ō-plăs′tĭk* [Eng. *plastic*]: converting fibrinogen into fibrin. FI′BRINOPLAS′TIN, n. *-plăs′tin*, paraglobulin; a name formerly given to the substance which was supposed to unite with fibrinogen to form fibrin.

FIBROIN, or FIBROINE, *fī′brō-ĭn:* $C_{71}H_{107}N_{24}O_{25}$, or $C_{15}H_{23}N_5O_6$. Both these formulæ have been given to fibroin, which constitutes the chief part of the fibre of silk. It is extracted by digesting the silk with water, under a pressure of three atmospheres, and then removing the fat with ether; it is a white mass. Boiled with dilute sulphuric acd, it yields leucine, tyrosine, and glycocine. It is the principal constituent of cob-webs and the horny skeletons of sponges.

FIBROLITE, n. *fī′brō-līt* [L. *fibra*, a fibre; Gr. *lithos*, a stone]: in *mineral.*, monoclinic, transparent or translucent mineral, occurring in gneiss, mica schist, and related metamorphic rocks in Bohemia, Bavaria, and parts of the United States. Color, brown or olive-green. Fibrolite was much used for stone implements in w. Europe in the Stone Age.

FIBULA, n. *fĭb′ū-lă* [L. and It. *fibŭlă*, a buckle]: the outer and smaller bone of the leg; in *archæol.*, a kind of brooch or pin; in *mason.*, iron cramp by which stones are fastened together; in *surg.*, needle for sewing up wounds. FIB′ULAR, a. *-lėr*, pertaining to or situated near the *fibula*. FIB′ULATED, a. *-lā-tĕd*, resembling a brooch or buckle.

FICHTE, *fĭch′tėh*, IMMANUEL HERMANN: professor of philosophy at Tübingen: 1797, July 18—1879, Aug. 8; b. Jena; son of Johann Gottlieb F. He early applied himself to philosophical studies, being attracted by the later views of his father, which he considered essentially *theistic*. He also attended the lectures of Hegel, but felt averse to his pantheistic tendencies, and leaned more to Schleiermacher and Schelling. Occupied at first as a teacher, F. was appointed prof. of philosophy in Bonn 1836, and 1842-63 held a chair in the Univ. of Tübingen. His chief works are—*Beiträge zur Characteristik der neuern Philosophie* (1841), *Grundzüge zum Systeme der Philosophie* (1839-47); *System der Ethik* (1850); *Anthropologie* (1856); *Psychologie* (1864); *Vermischte Schriften* (1869), etc. He suggested meetings of philosophers similar to those held by physicists; and at one at Gotha 1847 he delivered an address *On the Philosophy of the Future* (Stuttg. 1847). The great aim of his speculations has been to find a philosophic basis for the personality of God, and for his theory on this subject he has proposed the term *Concrete Theism*, to distinguish it alike from the abstract theism which makes God almost an unreality—a barren aggregate of lifeless attributes; and on the other hand, from the all-absorbing pantheism of Hegel, which swallows up the human and the divine in its own inapprehensible totality. F.'s *Zur Seelenfrage* was translated by J. D. Morell (*Contributions to Mental Phylosophy*, 1860). Later works were *Die Theistische Weltansicht*, 1873; *Fragen und Bedenken* (1876). During the movements of 1848, he issued several political tracts. From 1863 onward he lived in retirement at Stuttgart, where he died. The principle of F.'s politics is not unlike Dr. Arnold's maxim.

He holds that there is only one kind of real conservatism, that of constant well-planned reform; and that all revolution consists either in attempts to precipitate prematurely the future, or to go back to ideas that are effete, the last being only the chrysalis form of the first. The state, 'according to the idea of benevolence,' belongs to the future. The regeneration of Christianity would consist in its becoming the vital and organizing power in the state, instead of being occupied solely, as heretofore, with the salvation of individuals. To this recent school of philosophy belong Weisse, Chalybœus, Wirth and others.

FICH'TE, JOHANN GOTTLIEB: 1762, May 19—1814, Jan. 27; b. Rammenau, Upper Lusatia: illustrious German philosopher. In 1775, he was placed at the gymnasium of Pforta, near Naumburg; and 1780 he entered the Univ. of Jena, where he applied himself first to theology, afterward to philosophy. During 1784–88, he supported himself in a precarious way as tutor in various Saxon families. Subsequently he went to Zurich in a similar capacity, where he made the acquaintance of the excellent lady who afterward became his wife, Johanna Maria Rahn. In 1791, Fichte obtained a tutorship at Warsaw in the house of a Polish nobleman. The situation, however, proved disagreeable, and was given up by the fastidious philosopher, who went to Königsberg, where he had an interview with Kant, of whom he had become an ardent disciple. Here he wrote, 1792, his *Kritik aller Offenbarung* (Critique of all Revelation), which he showed to that philosopher, who praised it highly, but still maintained a certain air of reserve toward the enthusiastically earnest author, which pained the latter greatly. Leaving Königsberg, he entered the delightful family of the Count of Krokow, near Danzig, as tutor; was enabled to marry; and 1794 was appointed to the chair of philosophy at Jena, where he commenced to expound with extraordinary zeal his system of transcendental idealism. Fichte, in fact, *preached* his philosophy as if he believed its reception essential to the salvation of his hearers. In 1795, he published *Wissenschaftslehre* (Doctrine of Science), in which he clearly broke away from Kant, whose speculations did not seem to him sufficiently thorough, or, as Englishmen would say, *idealistic*. Indeed, as early as 1793, writing to Niethammer, he says: 'My conviction is, that Kant has only *indicated* the truth, but never unfolded or proved it.' An accusation of atheism, which Fichte fervidly but fruitlessly refuted, cost him his chair 1799. In the previous year, he published his *System der Sittenlehre* (System of Ethics, Jena 1798), considered by many his most mature work. He now removed to Berlin, where he delivered lectures on philosophy to a select audience. In 1800, appeared *Ueber die Bestimmung des Menschen* (On the Vocation of Man). In 1805, he obtained the chair of philosophy at Erlangen, with the privilege of residing at Berlin in the winter. Here he

delivered his celebrated lectures, *Ueber das Wesen des Gelehrten* (On the Nature of the Scholar, Berlin 1805–6). In the same year appeared *Grundzüge des gegenwärtigen Zeitalters* (Characteristics of the Present Age); and 1806, *Anweisung zum seligen Leben oder die Religionslehre* (The Way to the Blessed Life, or the Doctrine of Religion). But Fichte was a patriot as well as a philosopher. The victories of Napoleon at Auerstadt and Jena drew forth the famous *Reden an die deutschen Nation* (Addresses to the German Nation). These addresses were full of the most exalted enthusiasm. They were delivered in Berlin in 1807–8. The city was then full of French troops, and it took great courage for a literary man, single handed, to deliver those stirring appeals to German patriotism. They not only evoked a great outburst of national spirit which drove the French out of Prussia, but gave the initial impulse to the national determination to achieve greatness in culture, which has resulted in German pre-eminence during the last century in all intellectual fields. For his service at this time, Germans rightly count Fichte among their national heroes.

The Prussian king appreciated the zeal of the eloquent metaphysician, and, on the restoration of peace, requested him to draw up a new constitution for the Berlin University. In 1810 the univ. was opened, with a host of brilliant names, Fichte, Wolff, Müller, Humboldt, De Wette, Schleiermacher, Neander, Klaproth, and Savigny. By the votes of his colleagues, Fichte was unanimously elected rector. Here, as at Jena, he labored with unremitting er ergy for the suppression of all those customs which he deemed barbarous in themselves, and incompatible with the true idea of a scholar. In 1813, the war of independence broke out, and the hospitals of the Prussian capital were soon crowded with patients. Fichte's wife was one of the first who offered her services as a nurse. For five months she tended the sick with all the patient tenderness and devotion of her nature. At last, she was seized with fever, 1814, Jan. 3. After a fearful struggle, she recovered; but her husband caught the infection, and in spite of all remedies, sank under its influence, and died.

It is difficult to speak calmly of Fichte. His life stirs one like a trumpet. He combines the penetration of a philosopher with the fire of a prophet, and the thunder of an orator; and over all his life lies the beauty of a stainless purity. See *Fichte's Leben und literarischer Briefwechsel* (published by I. H. Fichte, 2 vols. 1831; 2d ed. 1862); and Dr. William Smith's *Memoir* (Lond. 1848). The fundamental notion of the idealism set forth in Fichte's writings, at least in the earlier of them, is the sole reality of the *Ego* or I, which posits both itself and the *Non-ego,* or Not I. (The phrase 'to posit,' it ought to be observed here, signifies in German Metaphysics, to present to the consciousness. Hence, when it is said that the *ego* posits itself, the meaning is, that the *ego*

becomes a fact of consciousness, which it can become only through the antithesis of the *non-ego*.) Under this ego, however, must not be understood, according to the usual misapprehension, the human and finite, but the 'absolute subject-objectivity' (*absolute subject-objectivität*), the eternal, universal reason. The ego is the absolutely productive, which, however, would not attain to consciousness of itself—i.e., of its infinite spontaneous activity, did it not at the same time place in contrast to itself, and as an impediment (*anstoss*) and limit to its activity, the non-ego—i.e., the objective world, or nature. The ego, so far as it is determined by the non-ego, is the intelligent ego, and, as such, the subject of theoretical science; the ego, on the other hand, as determining the non-ego, is the subject of practical science. Freedom, absolute, spontaneous activity, for its own sake, is not with Fichte as with Kant, the condition and pre-supposition of moral action, but is itself the highest expression of the problem of the moral law. To realize this self-activity, however, the ego requires an external world of objects, in order that in them as limits it may become conscious of its own activity. To this idealistic system of ethics it has been plausibly—some think unanswerably—objected that it asserts that the non-ego is required as the condition of morality, and at the same time represents the removal of this condition as the aim of moral effort. With respect to the idea of right, Fichte's theory of freedom, in its fundamental principles, attached itself to the Kantian theory of freedom as the innate and primitive principle of right. Generally speaking, Fichte makes that which, from the standpoint of ordinary consciousness, we call the world, merely a product of the ego; it exists only through the ego, for the ego, and in the ego. Fichte himself afterward modified or extended his system, to bring out more prominently the *religious* character of his metaphysics. The transition to this later stage of Fichte's philosophy is seen in *Bestimmung des Menschen* (Vocation of Man), which, on the whole, is the best popular exposition of his philosophy. It arose from the intense religiosity of his nature. Fichte was essentially a worshipping nature, and though he never ceased to be a philosopher, the untiring aspiration of his later years was to realize in his own way the belief of the great Jewish lawgiver: 'The eternal God is thy refuge, and underneath are the everlasting arms.' A popular exposition of his later philosophy is given in his *Anweisung zum seligen Leben*. It is set forth in a strictly scientific manner in the lectures in the *Nachgelassene Werke*, edited by I. H. Fichte (3 vols. Bonn 1834–5), in which his *Speculative Logik* and his revised theory of right and morals are particularly deserving of attention. Although Fichte never, strictly speaking, formed a school, and though his system has been adopted by only a few, such as J. B. Schad, Mehmel, Cramer, Schmidt, and Michaelis, his influence upon the subsequent development of German

philosophy has been very important. Fichte's collective works have been published by his son, I. H. Fichte. See the admirable little work on Fichte by Prof. Adamson (1882). His popular works have been translated into English by Dr. William Smith; their titles are—*The Vocation of Man, The Vocation of the Scholar, The Nature of the Scholar, The Way to the Blessed Life,* and *The Characteristics of the Present Age.* His complete works in the original were edited by his son, (11 vols. Berlin 1845–6).

FICHTELGEBIRGE, *fĭch'tĕl-gā-bĭr'gĕh:* range of pine covered mountains on the n. frontier of Bavaria, from which the principal ranges of Germany diverge. It extends from the vicinity of Baireuth n.e. 36 m. to the frontier of Bohemia, where it is merged into the Erzgebirge which continues in the same direction. The Main, Naab, Eger, and Saale rivers rise among its summits, the highest of which are the Ochsenkopf (ox-head) 3,397 ft., and the Schneeberg (snow mountain) 3,450 ft. The range receives its name from the great pine forests which cover it.

FICHU, n. *fĭsh'ô* [F. *fichu*—from *ficher,* to fix on]: a small handkerchief worn on the neck, or on the neck and over the shoulders.

FICINO, *fe-chē'nō,* Marsilio: illustrious philosopher of the Italian Platonic school: 1433–99; b. Florence; son of the principal physician of Cosmo de' Medici. To the liberality of this prince he owed the classical culture which inspired his career. At the suggestion of Cosmo, Ficino undertook the translation of Plotinus, Iamblichus, Proclus, and Porphyry, besides a Latin but by no means literal version of Plato. In 1463, he was appointed by Cosmo pres. of a classical soc. or acad., founded 1440, having for its aim the diffusion of the Platonic doctrines, which Ficino held to be the basis and confirmation of the Christian system. On the death of Cosmo, Ficino was favored by that prince's grandson, Lorenzo de' Medici; and at the mature age of 40, he entered the priesthood. His theological doctrine, while undoubtedly sincere, is a strange medley of incongruous views, the natural result of his attempt to fuse the philosophy of Plato with the Christian creed. Ficino's collected works, published at Basel (2 vols. f. 1491), consist of translations from the Greek philosophers, and original metaphysical and theological compositions, among which are the *Theologica Platonica, De Religione Christiana,* the Latin epistles, and a Commentary on the Epistles of St. Paul.

FICKLE, a. *fĭk'l* [AS. *ficol,* vacillating: Ger. *ficken,* to move quickly to and fro; comp. Gael. *faicill,* caution, care]: apt to change in mind or purpose, usually associated with light and trifling minds; wavering, unstable; of a changeable mind; variable. Fickleness, n. *fĭk'l-nĕs,* the state of being fickle; inconstancy; uncertainty.—Syn. of 'fickle': capricious; inconstant; irresolute; unsettled; vacillating; unsteady; changeable; changeful; mutable.

FICO, n. *fē'kō* [It. *fico*, a fig—from L. *fīcŭs*]: in *OE.*, a fig; an act of contempt expressed by raising the arm and snapping the fingers = a fig for you.

FICOIDEÆ, n. *fī-koy'dē-ē* [L. *ficus*, fig; Gr. *eidos*, form, appearance]: in *bot.*, name given by Jussieu to the order called by Lindley *Mesembryaceæ*.

FICTILE, a. *fĭk'tĭl* [L. *fictĭlĭs*, earthen—from *fictus*, formed or shaped: It. *fittile*]: molded into form by the potter's art; pertaining to pottery. FIC'TOR, n. *-tẽr*, an artist who works in wax, clay, or other plastic material.

FICTION, n. *fĭk'shŭn* [F. *fiction*—from L. *fictĭōnĕm*, a making, a feigning—from *fictus*, feigned, invented: It *fizione*]: the act of inventing; that which is feigned or invented; a falsehood; a fable; novel literature. FIC'TIONIST, n. a writer of novels. FICTI'TIOUS, a. *tĭsh'ŭs*, feigned; not real; false. FICTI'TIOUSLY, ad. *-lĭ*. FICTI'TIOUSNESS, n. not real; false. FICTI'TIOUSLY, ad. *-lĭ*. FICCTI'TIOUSNESS, n. the state of being fictitious.—SYN. of 'fiction': fable; fabrication; parable; novel; romance; allegory; invention; falsehood;—of 'fictitious': artificial; counterfeit; spurious; supposititious; feigned; unreal; false.

FIC'TION: see NOVELS.

FIC'TION OF LAW: 'a supposition of law that a thing is true, which either is certainly not true, or at least is as probably false as true.'—Erskine, *Inst.* iv. 2, 38. Fictions have existed in all legal systems, and must be regarded as a species of legal falsehood, understood to be such, resorted to as enabling individuals who, by the strict letter of the law, would have been excluded from obtaining redress of evils, to procure redress. Two general maxims regulate the application of legal fictions—viz., that no F. shall be allowed to operate a wrong, and that no F. shall be admitted which in the nature of things is impossible. The Roman form of judicial procedure abounded with fictions, by which alone, in many cases, a party aggrieved could enforce his right. Thus, an heir, unjustly disinherited, by the *querela inofficiosi testamenti*, feigned that his father had been mad. A stranger in Rome, who had been robbed, could not obtain restitution without the *fictio civitatis*, whereby he feigned himself a citizen. Many of the fictions existing in Rome have found a counterpart in modern systems; thus, the *fictio longæ manus*, whereby lands at a distance were feigned to be delivered, resembles an English feoffment at law; in like manner, the *fictio traditionis symbolicæ* of keys of a warehouse to give possession of the articles contained therein, and of a deed in confirmation of the covenants contained therein. The *fictio unitatis personarum* was the original of the Scottish fiction, that the heir is *eadem persona cum defuncto*. But in no system of laws have fictions been so liberally adopted as in that of England. It is by means of fictions alone that the original limited jurisdiction of the courts of queen's bench and exchequer has been extended to ordinary suits. In the latter court, every plaintiff assumed

that he was a debtor to the crown, and was debarred from discharging his obligation by the failure of the defendant to satisfy his demand; in the former, it was assumed that the defendant had been arrested for some supposed trespass which he had never in fact committed. The fictitious characters of John Doe and Richard Roe long contributed to make the action of ejectment famous. And though these fictions have disappeared before the ruthless hand of modern legislation, yet to this day, in an action at the instance of a father for the seduction of his daughter, damages can be awarded only on the assumption that she was his servant, and that he has suffered pecuniary loss by deprivation of her services. In chancery, the whole doctrine of uses and trusts is based on a fiction. Perhaps the best explanation of the introduction of fictions into legal systems is in Dr. Colquhoun's *Summary of the Roman Civil Law*, 2027. It involves, he says, 'less difficulty to adhere to known and admitted forms, and gradually to accommodate them to the changed state of society, than to upset all the incidents connected with them by a sudden change, which must ever tend to unsettle the law and practice of the courts. All nations have therefore found it more desirable to let the one glide into the other, than to adopt any abrupt measure which might disturb the practice and effect of former decisions.

FĬCTIVE, a. *fĭk'tĭv* [F. *fictif*, fictitious—from L. *fĭctīvŭs*—from *fictus*, invented]: feigned; pretended or unreal. FIC'TIVELY, ad. *-lĭ*, in a pretended or feigned manner.

FICTOR, n.: see FICTILE.

FI'CUS: see FIG.

FID [from Lat. *findere, fidi*, to divide]: instrument for splicing ropes. It is a large pointed pin with an eye at the thick end, of iron or lignum vitæ, used by sailors in separating and interlacing the strands of which the rope is composed. Fid is also a small thick lump of anything; a bar or pin of metal or wood used to support or steady anything; a plug of oakum for the vent of a cannon. MAST-FID, bolt inserted through the bottom of a ship's topmast or top-gallant-mast, with ends resting on the trestle-trees sustained by the head of the lower mast or topmast. Unless the mast-fid be withdrawn, the supported mast cannot be lowered.

FIDALGO, n. *fē-dăl'gō* [Port.]: nobleman or one royally descended: see Spanish HIDALGO.

FIDDEMIN: one of the handsomest villages of the Fayûm, inhabited by a Mussulman and Coptic population. It is surrounded by fruit trees, and is remarkable for a large olive, supposed to be the original one planted in Egypt, and yielding annually 268 pounds of olives.—Clot Bey, *Aperçu générale sur l'Égypte* (8vo, Paris 1840), I. 213.

FIDDLE, n. *fĭd'l* [Ger. *fiedel;* Dut. *vedele*, a fiddle—from mid. L. *vitŭla*, a violin: L. *fĭdēs*, any stringed instru-

ment]: a violin (q.v.). FIDDLER, n. *fĭd'lẻr*, one who plays on a fiddle. FIDDLE-BLOCK, in *naut.*, a long block having two sheaves of different diameters in the same plane, not in parallel planes, as in a double-block; a viol, or long tackle block. FID'DLE-FAD'DLE, n. *-făd'l* [a word directly imitative of the light rapid movements of the fiddle-bow]: a trifling or fanciful matter; trifling talk: ADJ. trifling; making a bustle about nothing. FIDDLE-FISH, the angel-fish, from its resemblance to a fiddle. FIDDLE-GRASS, in *bot.*, *Epilobium hirsutum.* FIDDLE-HEAD, in *naut.*, the ornamental carving at the bows of a ship, when it is made in the form of a scroll or volute similar to the end of a fiddle. FID'DLESTICK, n. the bow for playing a fiddle; a term employed for a thing below notice. FIDDLE-WOOD, genus *Citharexylum.* From the fact that the French *fidéle* (applied to one species from its durable qualities) has become corrupted into Eng. *fiddle*, has arisen the erroneous notion that the wood of this genus is suitable for making violins. The error has been perpetuated also in the Latin name, which means harp-wood. FIDDLER'S-FARE, meat, drink, and money. FID'-DLING, a. trifling: N. the playing on a fiddle. TO PLAY FIRST FIDDLE, to act as head man or chief. TO PLAY SECOND FIDDLE, to act a subordinate or inferior part.

FIDEICOMMISSUM, *fĭd'ē-ī'kŏm-mĭs'sŭm*, in the Civil Law: conveyance of property in trust to be transferred to a third person named by the truster. *Fideicommissa*, when introduced, were not supported by the law. The performance of them depended, therefore, on the conscience of the party intrusted, and they were consequently often not carried out. They were adopted originally for the purpose of conveying property either where a party, from the circumstances of the case, as inability to procure the proper number of witnesses, was prevented from executing a will; or where he desired to benefit those who, by law, were precluded from taking the property. To effect this purpose, an actual conveyance was made to a friend, coupled with a request that the property should be transferred to another. Fideicommissa having thus been introduced for a special purpose, were by degrees extended to conveyances of the whole inheritance, and finally were used for the purpose of settling estates in a particular order of succession, forming the earliest instance of entails (q.v.). Fideicommissa received the sanction of positive law first in the reign of Augustus, by whom authority was given to the pretor to enforce the performance of these fiduciary obligations.—*Institutes*, ii. 23, s. 1. Emperor Claudius subsequently extended this authority to the consuls and presidents of provinces. Fideicommissa were either *particular* or *universal*, the former a bequest of a particular subject, or a part only of the inheritance; the latter comprehending the whole estate.—In *Holland*, the principles of the civil law as to fideicommissa form an important branch of the law in regard to landed estates. Grotius *Dutch Jurisprudence*, by Herbert, b. ii. c. 20.

FIDEJUSSION, n. *fī-dē-jŭ′shŭn* [L. *fides*, faith; *jubeo*, I order]: state or act of being bound as surety for another; suretyship; bail. FIDEJUS′SOR, *-jŭs-ẽr*, surety; one bound for another.

FIDELITY, n. *fī-dĕl′ĭ-tĭ* [F. *fidélité*—from L. *fidēlĭtātem*, faithfulness—from *fĭdēs*, faith: It. *fidelita*]: faithfulness; integrity; veracity; honesty.—SYN.: constancy; steadiness; steadfastness; firmness; stability; permanence; faith; loyalty; fealty.

FIDES, n. *fī′dēz* [L.]: in *myth.*, the goddess of Faith and Honesty; in *astron.*, see PLANETOIDS.

FIDGET, v. *fĭj′ĕt* [Icel. *fikꝛ*, to climb up nimbly: Sw. *fika*, to hunt after: Swiss, *fitschen*, to flutter to and fro: Dut. *ficken*, to switch: Ger. *fick-facken*, to fidget]: to make light involuntary movements; to be unable to keep still: N. restless agitation. FIDG′ETINESS, n. *-ĭ-nĕs*, the quality or state of being fidgety; nervous restlessness or uneasiness; a fidgety person. FIDG′ETING, imp. FIDG′ETED, pp. FIDGETY, a. *fĭj′ĕt-ĭ*, restless; uneasy; impatient. FIDG′ETS, n. plu. restlessness: uneasy and irregular motions, arising from some cause of irritation which requires muscular action for its relief.

FIDICULA, *fĭ-dĭk′ū-la:* small musical instrument in the shape of a lyre.

FIDONIA, n. *fī-dō-nĭ-a:* in *entom.*, genus of Lepidoptera, belonging to the family *Geometridæ* or geometers, formerly called *Bupalus*. *F. piniaria* (the bordered white moth) is a beautiful insect having its wings on the upper side of a dusky-brown color, and adorned with pale yellow spots. The larvæ feed on fir.

FIDUCIAL, a. *fĭ-dū′shĭ-ăl* [L. *fidūcĭă*, confidence—from *fīdō*, I trust: It. *fiduciale*]: confident: undoubting; of the nature of a trust. FIDU′CIALLY, ad. *-lĭ*. FIDU′CIARY, a. *-ẽr-ĭ*, unwavering; held in trust: N. one who holds anything in trust; one who depends on faith without works. FIDUCIAL MARK, a standard or reference mark on an instrument.

FIE, int. *fī* [Icel. *fy:* Ger. *pfui:* W. *ffi*]: an exclamation of dislike or disapprobation.

FIEF, n. *fēf* [F. *fief*, a fief, a tenure—from mid. L. *feodum*, or *feudum* (see FEE)]: land held of a superior on condition of military service; land held of a superior; see FEUDAL SYSTEM. *Note.*—Littré derives from O.H.G. *fihu*, or *feho*, possessions, goods, cattle—see Skeat.

FIELD, n. *fēld* [Ger. *feld:* Dut. *veld*, the open country, soil: prov. Dan, *fald*, an inclosed portion of cultivated soil]: a piece of land inclosed for tillage; the open country; a battle-ground; room; space; the entire space within which objects are seen by a telescope or microscope. In *her.*, the surface of the shield; the blank space on which figures are drawn or projected; so called, according to some, because it represents the field of battle on which the

achievements or charges represented on it are supposed to have been gained. In blazoning, the tincture or metal of the field must be the first thing mentioned. FIELD'ED, a. in *OE.*, in the field of battle. FIELDING, the act of catching or stopping and returning to the wicket-keeper (in cricket) or to the pitcher (in base ball) balls hit by the batsmen; in *vinegar manuf.*, exposure to the open air and sun of malt-wash, or gyle in casks, in order to promote its acetification. FIELD-ALLOWANCE, daily sum of money granted to officers to meet extra expenses while on active services. FIELD-BOOK, note-book used in surveying. FIELD-BUG in *entom.*, the genus *Pentatoma*. The name is intended to distinguish it from the bed-bug. FIELD-COLORS, flags about eighteen inches square used for marking out the ground for squadrons and battalions. FIELD-CORNET, magistrate of a township in the Cape Colony. FIELD-DAY, a military review; a gala-day. FIELD-DUCK, in *zool.*, *Otis tetrax*, or little bustard. It is a native of France. FIELD-GLASS, *glăs*, a telescope; a binocle; the lens usually interposed between the object-glass and eye-glass of a microscope, which, receiving the diverging rays from the former, before they form an image, contracts the dimensions of the image, and increases its brightness, so as to render it of a proper size and degree of distinctness for being viewed by means of the eye-glass: see FIELD OF VIEW: MICROSCOPE. FIELD-MADDER, in *bot.*, a common modern book-name for *Sherardia arvensis*, a plant belonging to the order *Rubiaceæ*. FIELD MARSHAL, *-mâr'shăl*, highest rank of general officers in the British and some foreign armies. In the British army, it is a special honor given to very few officers, and conferred only by selection, on the ground either of distinguished service or of royal birth. When unemployed, the field-marshal has no higher pay than any other general. The equivalent rank in the British navy is that of admiral of the fleet. Formerly, a captain-general was occasionally appointed, who had rank higher even than a field-marshal. FIELD-MOUSE, popular name for certain species both of MOUSE and of VOLE: see these titles. FIELD-OFFICER, one competent to command a whole battalion—viz., major, lieutenant-colonel—in distinction from one of those merely intrusted with company duties, as a captain, or a lieutenant. FIELD-PIECE, a cannon mounted on a wheeled carriage for moving about in the field. FIELD-SPORTS, diversions in the open country, as in shooting and fishing. FIELD-TRAIN, department of the artillery, consisting of commissaries and conductors of stores, responsible for safe custody of the ammunition, for formation of proper depôts of shot, etc., between the front and the base of operations, and that a due portion shall be constantly at the service of each gun during an engagement. FIELD-VOLE, in *zool.*, *Arvicola agrestis*, or short-tailed field-mouse. FIELD-WORKS, intrenchments and other temporary fortifications thrown up by an army in the field, either as protection from a hostile force, or to

cover an attack on some stronghold: see FORTIFICATION. FIELD OF BLOOD: see ACELDAMA. FIELD OF ICE, a large mass of floating ice in the sea or large river. FIELD OF VISION or VIEW, the whole space within which objects can be seen through an optical instrument; more strictly the space within which the image of an object may be seen by whole pencils. That part of the image which is seen by partial pencils of the light from the object speculum or lens is called the *ragged edge*, and usually a diaphragm is employed to cut it off altogether from the view of the observer. TO KEEP THE FIELD, to continue in active operations, as an army. TO TAKE THE FIELD, to begin active operations against an enemy. IN THE FIELD, employed in a campagn against an enemy.

FIELD, *fēld*, CYRUS WEST: 1819, Nov. 30—1892, July 12; promoter of submarine telegraphy; b. Stockbridge, Mass.; son of David Dudley Field (q.v.). He was educated in his native town, became a clerk in New York 1834, and began manufacturing paper 1840. In 1853 he partially retired from business, and spent several months in S. American travel. The same year, being asked to furnish the money to build a land-telegraph across Newfoundland to expedite news from Europe, he conceived the idea of stretching a line across the Atlantic ocean. He consulted with his brother David Dudley Field, Peter Cooper, Marshall O. Roberts, Moses Taylor, and Chandler White, and, receiving assurances of financial support from them, went to New Foundland 1854, and obtained from its legislature the exclusive right for 50 years of landing telegraph cables from Europe and America on that island. Returning to New York he organized the New York, Newfoundland and London Telegraph Company with the above gentlemen, of whom Messrs. Cooper, Roberts, Taylor, and White, agreed to contribute $20,000 each, and after soliciting financial aid in England, he subscribed for a fourth interest. Within two years lines were completed from New York across Newfoundland. In 1855 a cable designed to extend from Newfoundland to Cape Breton Island was lost in a storm while being laid, but a second cable was successfully laid the next year. This became inoperative within a short time. In 1856 he organized the Atlantic Telegraph Company in London, for which he furnished over one-fourth the capital, and after several attempts and failures telegraphic communication between the two continents was established 1866, July 27 (see ATLANTIC TELEGRAPH). In connection with this work he made over 50 passages across the Atlantic, during nearly 13 years of anxious, unceasing toil. Congress unanimously voted him a gold medal and the thanks of the nation, and unusual honors would have been conferred upon him had be been a British subject. In 1867 he received the grand medal—its highest prize—of the Paris Exposition. In 1869 he was the representative of the New York chamber of commerce at the opening of the Suez canal, and subse-

quently was interested in laying cables between Europe, India, China, Australia, the West Indies, and S. America; also in the construction of the Third ave. elevated railroad in New York, and the management of the Wabash, St. Louis and Pacific railroad. He made a trip around the world 1880, erected a monument to Maj. André, on his property at Tarrytown, N. Y., which was first partially then wholly destroyed with dynamite by persons unknown; and in conjunction with his brothers prepared and gave a public park and a library to the town of Stockbridge, and built there a church in memory of his parents. The closing years of a notable and useful career were embittered by the loss of most of his fortune in Wall street in 1890, and the disastrous and criminal failure of his son in 1891, which swept away nearly all that he had.

FIELD, David Dudley, D.D.: 1781, May 20—1867, Apr. 15; b. East Guilford, Conn.: Congl. minister. He graduated at Yale 1802, studied theol. with the Rev. Charles Backus, was licensed to preach by the New Haven Congl. Assoc. 1803, Sep.; was ordained pastor of the Congl. Church, Haddam, Conn., 1804, Apr. 11, and remained there till 1818. He then made a missionary tour through w. N. Y., and in 1819, Aug., was installed pastor of the only church in Stockbridge, Mass. After a faithful service of 18 years there, he returned to his Haddam congregation, and ministered there till 1844, when on the division of the congregation he went to Higganum, where he officiated 7 years, afterward making his permanent home in Stockbridge. He was vice-pres. of the Conn. Hist. Soc., and corresponding member of the Mass. and Penn. Hist. Socs. He published *History of the County of Berkshire* (1829); *History of the County of Middlesex* (1839); *History of Pittsfield* (1844); and *Genealogy of the Brainerd Family* (1857). He received the degree D.D. from Williams College 1837.

FIELD, David Dudley, LL.D.: 1805, Feb. 13—1894, Apr. 13; lawyer; b. Haddam, Conn., son of David Dudley Field (q.v.). He graduated at Williams College 1825, studied law in Albany and New York, was admitted to the bar 1828, and practiced continuously in New York till 1885. From an early period in his professional career he labored to secure a reform in the practice of law. In 1839 his first efforts resulted in a *Letter on the Reform of the Judiciary System*, the substance of which he presented in an address to a legislative committee that had been appointed through his influence. He prepared and gained the introduction of three bills on the subj ect1841, but no decisive action was taken on them. Five years later he published in pamphlet *The Reorganization of the Judiciary*, and the constitutional convention of 1846 recommended a general code such as he suggested. His next step was the publication of *What Shall be Done with the Practice of the Courts? Shall it be wholly Reformed? Questions addressed to Lawyers* (1847), and soon after its appearance he was appointed a commis-

sioner to reform the practice in the state. At the end of two years he reported two codes of procedure, one civil, the other criminal. The former was almost wholly adopted by the state and has since been adopted by 23 states and territories. In 1857 he was appointed chairman of a commission to codify the whole body of the law, and 1865 reported a political code, penal code, and civil code. Nearly 25 years were spent in the preparation of these 5 codes. Later he headed an organization for the reform and codification of the law of nations, looking to arbitration for the settlement of international disputes. He filled an unexpired term in congress 1876, was one of counsel for the democratic party before the electoral commission 1876–7, and in later years acted with that party.

FIELD, Edward, American antiquarian: b. Providence, R. I., 1858, Oct. 4. He was for years a school commissioner of Providence and served as city auditor pro tem. He was made clerk of probate 1889, and record commissioner of Providence 1891, is a member of several historical societies, and is historian of the Rhode Island Society of the Sons of the American Revolution. He has published: *Tax Lists of the Town of Providence during the administration of Sir Edmund Andros and his Council* 1686–1689 (1895); *Revolutionary Defenses in Rhode Island* (1896); *The Colonial Tavern* (1897); *Esek Hopkins, Commander-in-Chief of the Continental Navy During the American Revolution* 1775–1778 (1898); *Diary of Col. Israel Angell,* 1778–1781; *Early Records of the Town of Providence* (18 vols., 1891–1904); *The Remains of Major General Nathaniel Greene* (1903); etc.

FIELD, Eugene: journalist and poet: 1850, Sep. 2—1894, Nov. 4; b. St. Louis, Mo.; son of Roswell Martin Field, first attorney for Dred Scott. He entered Williams Coll. 1868, Knox Coll. 1869, and the Univ. of Missouri 1871, leaving the latter at the beginning of his senior year, when he travelled abroad, having inherited about $70,000. On his return he entered the field of journalism, first in St. Louis, Mo., then in Chicago, where he remained till he died. His place was in the front rank of journalistic humorists, though he attained fame as a writer of loving and pathetic verses concerning children. His love for children was the inspiration of his best poetry. He published a number of books, prose and poetry, the latter being lyrical. His more important works comprise: *Culture's Garland* (1887); *Love Songs of Childhood; A Little Book of Western Verse; A Little Book of Profitable Tales* (1889); *A Second Book of Verse; The Holy Cross, and Other Tales; The Love Affairs of a Bibliomaniac.* In collaboration with his brother, R. M. Field, he published translations from Horace, *Echoes from the Sabine Farm.*

FIELD, Henry Martyn, d.d.: Presb. clergyman: b. Stockbridge, Mass , 1822, Apr. 3; d. there 1907, Jan. 26; son of David Dudley Field, d.d. He graduated at Williams College 1838, studied theol. in E. Windsor Seminary

and at Yale Divinity School, and was installed pastor of a Presb. church in St. Louis, Mo., 1842. He remained there five years, then spent three years in European travel, was a witness of the revolution in France and Italy 1848, and returning to the United States held a Congl. pastorate in West Springfield, Mass., 1851–54. In the latter year he removed to New York and became editor of the *Evangelist*, of which he subsequently became sole proprietor. He made a tour of Europe 1858, a journey around the world 1876–7, and a visit to the Hold Land, 1882. His published works include *The Good and the Bad in the Roman Catholic Church* (1848); *The Irish Confederates and the Rebellion of* 1798 (1851); *Summer Pictures: From Copenhagen to Venice* (1859); *History of the Atlantic Telegraph* (1866); *From the Lakes of Killarney to the Golden Horn*, 2 vols. (1876); *From Egypt to Japan* (1877); *On the Desert* (1883); *Among the Holy Hills* (1884); *The Greek Islands and Turkey after the War* (1885); and *Gibraltar* (1888). He was a most charming and instructive writer of travels, and his successive volumes have been received with wide popular favor.

FIELD, Kate: author: 1840–96, May 19; b. St. Louis, Mo.: daughter of Joseph M. Field. She received a seminary education in Mass., and studied music in Europe, spent several years in foreign travel, and while abroad corresponded with the New York *Tribune*, Philadelphia *Press*, Chicago *Tribune*, Boston *Courier* and *Transcript*, New Orleans *Picayune*, and Springfield *Republican*, and wrote numerous magazine articles and reviews of foreign subjects. In 1874 she made her first appearance as an actress as *Peg Woffington* in Booth's theatre, New York, and 1882–3 was pres. of a ladies' cooperative assoc. in New York. She was a skilful dramatic critic, and she attained popularity as a lecturer. Miss Field published *Planchette's Diary* (1868); *Adelaide Ristori* (1868); *Mad on Purpose*, comedy (1868); *Pen Photographs from Charles Dickens's Readings* (1868); *Haphazard* (1873); *Ten Days in Spain* (1875); and *History of Bell's Telephone* (1878). In 1890 she started a personal journal, *Kate Field's Washington*, which was discontinued 1895.

FIELD, Marshall, American merchant: b. Conway, Mass., 1835, Aug. 18; d. New York City 1906, Jan. 16. He received a common school and academic education in the intervals of labor on his father's farm. At 17 he entered a dry goods store in Pittsfield, Mass., as clerk, soon mastered the details of the business, and in 1856 removed to Chicago, where he entered the employ of Cooley, Wadsworth & Co., a pioneer mercantile house. In 1860 he was admitted to a junior partnership in the firm, which then became Cooley, Farwell & Co., and later Farwell, Field & Co. On the dissolution of this partnership the firm of Field, Palmer & Leiter was formed in 1865, and on the retirement of Palmer, two years later, the firm name became Field, Leiter & Co. In 1881 the Leiter interest was purchased by Mr. Field and the business was after-

wards continued under the firm name of Marshall Field & Co. Prior to the Chicago fire of 1871 the sales amounted to $12,000,000 annually, but have since steadily increased to more than $60,000,000, the firm being now the largest dry goods house in the world. The single large building which it occupied before the fire has been replaced by one much larger devoted to the retail trade, the wholesale business being carried on in an immense building covering an entire block. In addition to these two vast establishments the house has offices in New York, England, France, Germany, Switzerland, and Japan. Avoiding ostentation Mr. Field was a liberal and discriminating giver. In addition to the Field Columbian Museum (q.v.) given by him to Chicago, he bestowed gifts upon the University of Chicago, and to his native town of Conway he gave and endowed a public library, at a cost of $200,000, in memory of his parents.

FIELD, Stephen Johnson, ll.d.: assoc. justice U. S. supreme court; b. Haddam, Conn., 1816, Nov. 4; son of David Dudley Field, d.d., Congl. pastor in that town. When ten years old he accompanied a married sister to Smyrna to study oriental languages, graduated at Williams College, 1837, studied law with his brother David Dudley Field in New York, became his partner after being admitted to the bar, spent the year 1848 in European travel, and removed to Cal. 1849. Shortly after reaching San Francisco he became a founder of Marysville, was elected its first alcade, 1850, Jan., and a member of the legislature in Oct. following, served on the judiciary committee and taking a conspicuous part in the task of regulating the civil and criminal procedure of the courts of the state. In 1857 he was elected a judge of the supreme court of Cal. for six years, but before the time for entering upon his duty was appointed to fill a sudden vacancy on the bench of that court, and became chief justice on the resignation of David S. Terry, 1859, Sep. He held this office till 1863, when he was appointed by Pres. Lincoln an assoc. justice of the U. S. supreme court, which office he resigned 1897. In 1869 he was appointed prof. of law in the University of Cal., 1873 member of a commission to prepare amendments to the codes of the state for legislative action, 1877 became a member of the electoral commission (q.v.) and voted with the minority in favor of the democratic claim, and 1880 was a candidate before the national democratic convention for the presidential nomination. He was a man of deep scholarship and great independence of character, and during the exciting days of the early statehood of Cal. rendered many decisions at personal peril. In a number of instances like the Puebla case (1864), the test-oath and 'iron clad' oath cases, and the legal-tender, New Orleans slaughter-house, confiscation and Chinese queue cases, his keen decisions rendered him locally unpopular and elicited wide comment. But in all, his personal courage, profound legal erudition, and judicial integrity were never once questioned by right-

minded and orderly citizens. Judge Field received the degree LL.D. from Williams College 1864. He died 1899, Apr. 9.

FIELD COILS: see MAGNETISM and ELECTRICAL MACHINES.

FIELDFARE, n. *fēld'fär* [AS. *fealo-for*—from *fealo*, yellowish; *faran*, to go or wander], (*Turdus pilaris*): species of Thrush (q.v.), in size about equal to the blackbird, but with greater length of wing; general gray color, feathers tipped with a brownish black elongated spot; throat and breast reddish yellow, streaked and spotted with black; forepart of the back and wings of rich brown color; tail slightly forked and nearly black; under parts white. The fieldfare is a very common winter visitant of Britain, though it rarely breeds even in the n. parts of the island. It arrives from more northern regions when the winter has fully come, and departs toward the end of spring. It is well known to youthful sportsmen, and affords much employment for their guns during the Christmas holidays, when it may generally be found in small flocks—often with its smaller congener the redwing—in fields, if the weather is mild, feeding on worms, snails, etc., or in severe weather, about hedges, thickets, and woods, wherever haws and other such fruits or seeds are abundant. Its winter migrations extend south as far at least as the islands of the Mediterranean. It is one of the summer songsters of the n. of Europe and of Siberia; its song is soft and melodious, but is less often heard than its call-note, which is harsh. It is extremely plentiful in Norway, where its nests are generally built in spruce firs, and, contrary to the ordinary habits of thrushes, in society; numerous nests being often in the same tree, and '200 nests or more being frequently seen within a very small space.' The fieldfare is easily tamed and sings well in captivity.

FIELDING, *fēld'ing*, COPLEY VANDYKE: abt. 1787–1855, Mar. 3; English painter in water-colors. He began to exhibit 1810. For many years he held the office of Pres. of the Soc. of Painters in Water-colors, and was generally recognized as the representative of that branch of art in England. He died at Worthing, in Sussex, after a career of steady prosperity. Possessing remarkable mechanical dexterity and knowledge of effect, Fielding painted with what severe critics would call fatal facility. He contributed about a score of pictures annually to the exhibition of the Water-color Society. Yet, he always exhibited a certain easy finish of treatment, perhaps of itself a kind of secondary talent. Although his range of subjects was but limited, yet within it he was almost unrivalled. As a painter of marine effects, and of the landscapes of down and glade, it is thought by many that he has had as yet no equal.

FIELDING, HENRY: 1707, Apr. 22—1754, Oct. 8; son of Gen. Edmund F., connected with the Earls of Denbigh. He was sent to Eton, and then to the Univ. of Leyden.

for legal study. Returning to London, he began to write for the stage, and between 1727–36 produced nearly a score of comedies and farces, which were forgotten with nearly as much speed as they were produced. He married 1736, and falling heir to a small estate, he, with his young wife, retired from London. But his was not a Fortunatus's purse, and his hand was continually in it; and in three years after his marriage, he was back in London a student at the Temple. He was called to the bar at the usual time, but gout intervening, steady practice was rendered impossible. Happily, a way of escape was at hand. Richardson published *Pamela;* the town was ringing with it; and Fielding, whose strong, healthy, unconventional nature revolted from the moral priggishness of 'Virtue Rewarded,' resolved to write a counterpart, purporting to be the adventures of Pamela's brother, *Joseph Andrews*. This work, begun in a satirical mood, and intended merely to quiz Richardson, deepened as it proceeded and flowered out into humorous adventure. The exquisite character of Parson Adams took the world by surprise, and remains one of the permanent treasures of English fiction. The next important work undertaken by Fielding was *Jonathan Wild*, a master-piece of irony, which has never been sufficiently appreciated, and which doubtless suggested to Mr. Thackeray the scope and conduct of *Barry Lyndon*. The rebellion of 1745 induced Fielding to undertake the direction of the *Jacobite Journal*, in support of the Hanoverian succession and shortly afterward as a reward for his loyalty, he was, through the influence of Lord Lyttelton, promoted to a pension, and to the place of justice of the peace of Middlesex and Westminster. While engaged in magisterial duties, he produced *Tom Jones*, his most famous fiction, which the world has not ceased to read, nor critics to admire. His next work was *Amelia*—less striking and masterly than its predecessor, but quieter in style, and enriched with scenes of domestic tenderness. Shortly after its publication, he was attacked by dropsy, jaundice and asthma. Seeking relief, he went to Lisbon, but after a few months' residence died there. See the life prefixed to Leslie Stephen's edition of Fielding (10 vols. 1882), and the short work on Fielding by Austin Dobson (1883).

Fielding was the first great English novelist, and he remains to this day one of the greatest. *Tom Jones* is a miracle of invention, character and wit. It contains the most amusing scenes and adventures, the most sparkling delineations of life, high and low, the most abundant satire. Everywhere, the author's manliness, shrewd sense, and scorn of meanness and hypocrisy, are apparent. On the other hand, it must be said that Fielding's nature was more robust than delicate; that it was deficient in the sentimental and poetic side, and as a consequence, that his ideal of woman is not high, and his descriptions of the tender passion either commonplace or extravagantly rapturous. The love scenes between Tom and Sophia,

and the episode of the 'Man of the Hill,' meant to be passionate and poetic, are the portions of the great novel which readers skip. It is to be regretted that all Fielding's works are disfigured by coarseness of circumstance and expression; but that was the fault of the time as much as of the man. He was coarse, for the same reason that he wore ruffles, drank claret, and hated the Pretender. He set himself to paint society as he saw it, and painted it truthfully.

FIELD MAGNETS. See ELECTRICAL MACHINES.

FIELD OF THE CLOTH OF GOLD: historical name of the place between Ardres and Guisnes, where the French King Francis, entertained the English King Henry VIII. with unprecedented magnificence, 1580, June 4–24. Francis was anxious to gain the support of Henry and Cardinal Wolsey in his impending conflict with Charles V. of Germany, who had been elected Emperor of Spain also the previous year. Charles had previously sought the friendship of Henry and his famous cardinal, and had made a virtual promise of the papacy to the latter. Francis, enraged at Charles' election to the throne that he himself coveted, subsequently made the same promise to Wolsey, who is credited with arranging the meeting of the French and English courts on French soil. All manner of feats of chivalry, gallant exercises, dancing, dramatic representations, and even a wrestling match between the sovereigns, were provided. Though Francis's hospitality was boundless, he failed in his object. Henry, who held the balance in his hand, returned Charles' visit after his entertainment by Francis, and declared his desire to remain impartial but that he should pronounce against the aggressor. Francis began hostilities and in the midst of disasters, 1522, May 29, received a declaration of war from Henry. See Shakespeare's *Henry VIII.*, *Act* 1, *Scene* 1.

FIELD OF CONSCIOUSNESS. A person may be conscious at any one time in a vague way of a number of things—objects of vision, noises, smells, the pressure of the clothes, the movements of the limbs, feelings, emotions and ideas. The field of consciousness refers to the number of things over which one's consciousness is extended. The field may contract or expand from time to time. A relatively unchanging contraction is termed a state of concentration. The size of the field is subject to volition and it is also influenced by conditions of health and disease. The field may be markedly narrowed by sensory anæsthesias, the dominance of fixed ideas, by hypnosis, etc. Inside of the field, one is more aware of certain objects than of the others. This intense part of the field is called the focus, while the fringe refers to the relatively vague awareness of the remaining part of the field.

FIELD OF REGARD: denotes the angular extent of space visible when the eyes move to their fullest extent while the head and body remain stationary. The field of

regard is thus somewhat larger than the binocular field of vision. See FIELD OF VISION.

FIELD OF VISION: the term denotes the angular extent of space visible with stationary eyes and body. The field thus changes its position with every rotary movement of the eyes or body. The monocular fields overlap to a large extent, but they are not entirely identical. The binocular field is thus much larger than either monocular field. The size of the field is often narrowed in hysteria and allied mental disorders. The most acute vision is found in the center of the fields at the fixation or focal point. The sensitivity for colors, movement, and spatial differences varies for different parts of the field.

FIELDS, *fēldz*, JAMES THOMAS, LL.D.: 1717, Dec. 31—1881, Apr. 24; b. Portsmouth, N. H.: author and publisher. He received a public school education, became a clerk in a bookstore in Boston when 17 years old, read the anniversary poem before the Mercantile Library Assoc., the following year, helped establish the publishing firm of Ticknor, Reed & Fields, soon after attaining his majority, and continued a member of it through several changes of name till 1870. He edited the *Atlantic Monthly* 1862–1870, collected and issued De Quincey's writings in 21 vols., lectured frequently before the Dartmouth and Harvard College societies, and after retiring from the firm made a number of lecturing tours through the United States. He was author of editions of *Poems* (1849, 54, 58): *Yesterdays with Authors* (1872); *Hawthorne* (1876); and *In and Out of Doors with Charles Dickens* (1876); and with Edwin D. Whipple edited the *Family Library of English Poetry* (1877). He received the decree LL.D. from Dartmouth College 1867.

FIELD WINDINGS. See ELECTRICAL MACHINES.

FIEND, n. *fēnd* [Goth. *fiands;* Ger. *feind*, an enemy—from Icel. *fiá;* Goth. *fian*, to hate: Icel. *fiandi*, a hater, an enemy]: an infernal enemy; an implacable or malicious foe; the devil. FIEND'ISH, a. like a fiend; also FIEND'-LIKE, a. FIEND'ISHLY, ad. *-lĭ*. FIEND'ISHNESS, n. the quality of a fiend; intense maliciousness.

FIERAMENTE, adv. *fē-ār-a-mĕn'tā* [It.]: in *mus.*, proudly; fiercely; boldly.

FIERCE, a. *fērs* [F. *feroce;* OF. *fers*, fierce—from L. *fĕrōcĕm*, fierce—from *fĕrus*, wild]: savage; furious; very violent or passionate; very eager; outrageous. FIERCE'-LY, ad. *-lĭ*. FIERCE'NESS, n. ferocity; fury; violence.—SYN. of 'fierce': barbarous; fell; ferocious; wild; violent; impetuous; unrestrained; ardent; vehement.

FIERDING COURT, *fērd'ing kōrt*, (Fierding Thing): district court in use among the early Gothic nations. This court was established to render speedy justice in small matters. There were four of these courts in every hundred, each presided over by a separate judge, whose jurisdiction extended to all causes where the matter in dis-

pute did not exceed the sum of three marks. Stiernhook, *De Jure Goth.*, lib. i. c. 2.

FIERI FACIAS, n. *fī'ĕr-ī fā'shĭ-ăs* [L. *fiĕrī*, to be made; *făcĭăs*, you may make, you cause]: the first conspicuous words of a writ in Latin authorizing certain legal steps to be taken to recover a debt or damages allowed by the court. WRIT OF FIERI FACIAS, writ for enforcing the judgment of a court of law against the goods of a debtor. It may be sued out as soon as final judgment has been signed, or, in case of a trial out of term, in 14 days after verdict, unless, on special cause shown, a judge order speedy execution. But a writ of fieri facias cannot be enforced after a *Capias ad satisfaciendum* (q.v.) has been issued. The sheriff, in executing this writ, may not break open outer doors; but having obtained peaceable entrance, he may break open inner doors, cupboards and trunks. The officer in execution having taken possession, may leave an assistant in charge, by whom an inventory of the goods is made. He is entitled to remain on the premises a reasonable time, in order to remove the goods; but if he continue longer without the permission of the owner, he is liable to an action for trespass. The goods of the party only who is named in the writ may be seized (certain needful articles to a small amount being exempt from seizure); and if the officer take goods belonging to a stranger, he is liable to an action for damages. For the corresponding process in Scotland, see POINDING. *Fieri facias de bonis ecclesiasticis* in Eng. law, is a writ directed to the bishop of the diocese, requiring him to attach the ecclesiastical goods of a clergyman within his diocese, in satisfaction of the judgment of a court of law.

FIERY, a. *fīr'ĭ* [from *fire*, which see]: passionate; irritable; easily provoked; like fire; bright; impetuous. FIER'-INESS, n. *-ĭ-nĕs*, hot qualities; heat of temper. FIER'-ILY, ad. *-ĭ-lĭ*. FIERY CHAMBER. see CHAMBRE ARDENTE.—SYN. of 'fiery': burning; ardent; hot; scorching; vehement; impetuous; fierce; unrestrained; heated.

FIESCHI, *fē-ĕs'kē*, GIOVANNI LUIGI, Count: abt. 1523–1547, Jan. 2: member of one of the most illustrious houses of Genoa. His name has a tragic celebrity in connection with a conspiracy of which he was the chief. Andrea Doria, a famous admiral, sprung from a race hereditarily at feud with that of Fieschi,' having expelled the forces of Francis I. from the state, had restored the republican government, but at the same time, by his vigorous administration, effectually held in check the ambition of the nobles. Count Fieschi organized a plot, having for its object the death of Doria, and his nephew Gianettino, whom specially Fieschi hated, and the establishment of an oligarchic government. Instigated by the approval of France and Rome, and supported by an alliance with the Duke of Parma, Fieschi speedily enrolled a formidable array of accomplices, his three brothers among the foremost. Crowds of his own feudal retainers were secretly

armed and assembled from the various hereditary lands of the house; three galleys, purchased with the connivance of the pope, were fully equipped, and all being in readiness, the attempt was fixed for 1547, Jan. 2. Doria, in spite of repeated warnings, refused to ascribe treacherous or subversive designs to Fieschi, whom he regarded as a fast friend and partisan. Complete success seemed at first to be with the conspirators; the gates of the city were forced, the fleet captured, Gianettino assassinated, Doria in flight. Fieschi had but to appear and dictate, but he was nowhere to be found: in stepping from one galley to the other in the darkness of night, Fieschi had stumbled, and falling overboard, was borne down by his ponderous armor, and miserably drowned in the harbor, or, according to some, stifled in the slime.

FIES'CHI, Joseph Marco: 1790–1836, Feb. 16; b. Corsica: conspirator and assassin, on the life of King Louis Philippe. A profligate career appears to have reduced him to great poverty about 1835, when he conceived the diabolical design of assassinating King Louis Philippe—the immediate cause being the suppression of a situation which he held, by order of the Prefect of the Seine. Disguising his crime under the cloak of political enthusiasm, he leagued with himself two or three obscure persons, of pothouse politics, who hated the government of the Citizen King. Fieschi planned and caused to be made an infernal machine with 20 barrels, that could be simultaneously discharged. On the approach of the king and queen, at the review of the National Guards, in the Boulevard du Temple, 1835, July 28, he fired his machine, and killed 18 people, among whom was Marshal Mortier, who fell dead beside his sovereign. The king escaped with a mere scratch, and continued the review. Fieschi was immediately seized, and with his three accomplices, was tried, condemned, and put to death.

FIESOLE, *fyā'zo-lā* or *fe-ĕs'o-lā* (anciently, *Fæsulæ*): one of the most ancient Etruscan cities; on the crest of a hill, about three m. from Florence, of which it may be said to be a parent city. From the heights of Fiesole, the view presented by Florence and the neighboring valleys is gorgeous in the extreme. We find Fiesole first mentioned B.C. 225, during the great Gaulish war. Hannibal encamped there after crossing the Apennines. The city was destroyed by Sulla in the Social War (B.C. 90–89), and he afterward despatched thither a military colony. At the invasion of Tuscany by the Goths, Fiesole also fell under their dominion, and being by nature and art a formidable stronghold, was numerously garrisoned by the barbarians. The growth of Florence during the middle ages gradually reduced it to insignificance. The only vestige of Etruscan structures still remaining is the cyclopean city wall, of huge blocks of stone, many portions of which are wonderfully perfect. The site of the Etruscan fortress is now occupied by a convent, and interesting

fragments of the foundations are often brought to light. The amphitheatre and other remains belong to the Roman age. The very ancient church of St. Alexander, supposed to have been originally a pagan temple, contains an altar dedicated to Bacchus, the inscription of which is, however, illegible, owing to a fissure in the middle. Coins and other relics have been repeatedly dug up. Pop. abt. 2,500.

FIE'SOLE, Fra Giovanni da (known also as *Il beato Angelico*): one of the regenerators of Italian art: 1387–1455; b. Mugello. In 1407 he entered the Dominican order, and, with his brother, consecrated his artistic abilities exclusively to sacred aims, illustrating various works of devotion with beautiful miniature designs. These early artistic efforts are remarkable for rich effects of coloring, gorgeous illumination, and exquisite elaboration of the most minute ornamental details. Having achieved high reputation as frescoe painter by some noble compositions with which he endowed his own and other convents, he was commissioned by Cosmo de' Medici, with the decoration of the church of Santa Annunziata and the convent San Marco. Each cell of the convent was adorned with a fine fresco of large dimensions, and amid other paintings can still be distinguished Fiesole's 'Annunciation'. The fame of this work induced Pope Nicholas V to summon him to Rome, and intrust him with the execution of a series of illustrations taken from the life of St. Laurence, destined to embellish the private chapel of St. Laurence in the Vatican. See Giangiacomo Romano, *Le Pitture della Cappello di Nicolò V.* etc. (Rome 1810). So rigid a disciplinarian was Fiesole, that no private or public work was ever undertaken without the formal consent of his superiors being obtained, and to them all pecuniary renumeration was transferred. The archbishopric of Florence, spontaneously offered him by the pope was humbly declined. He died in Rome. The gallery of Florence possesses several pictures of Fiesole, still undimmed in brilliancy of coloring. One of these, the *Birth of John the Baptist,* is a conception full of simple and winning grace. Some of the largest easel-compositions of this artist at present adorn the gallery of the Louvre; among those in the antechamber are the *Coronation of the Virgin,* and the *Miracles of St. Dominico.* One supreme aim pervades all the creations of Fiesole—that of arousing lofty devotional feeling through the contemplation of the beautiful in art.

FIFE, n. *fīf* [Ger. *pfeife;* It. *piffaro,* F. *fifre,* a fife; imitative of a shrill note]: a small flute with one key; a kind of pipe. V. to play on the fife. Fī'fing, imp. Fifed, pp. *fīft.* Fifer, n. one who.—The *Fife* is an ancient wind-instrument of military music, in which the melody is produced by blowing through a hole in a reed or tube while the escape of air is regulated by the fingers stopping or opening a number of other holes in different parts of

the pipe. It has a compass of two octaves, from D on the fourth line of the treble clef to D above in altissimo. The fife figures in the sculptured memorials of the Argonautic expedition, and from that time to this has maintained its place as a simple yet effective instrument for martial purposes. It was common with English troops till the reign of James I., but was then discontinued; to be reintroduced by the Duke of Cumberland at the siege of Maestricht 1747. It is a universal favorite in the navy. Drums and fifes supply a simple but stirring music.

FIFE-NESS, *fīf-nĕs′:* promontory of Scotland, eastmost point of Fifeshire; lat. 56° 17′ n., and long. 2° 35′ w. A mile n.n.e., in the sea, is the dangerous Carr Reef, where a lightship was moored 1886. Fifeness is in view of the Isle of May and Bell Rock lights. In the Ness, trap rocks jut through the carboniferous strata, and the rocks contain small caves.

FIFESHIRE, *fīf′shėr:* maritime, almost peninsular county of the e. of Scotland, between the Firth of Forth on the south and the Firth of Tay on the north. It is 41½ m. in extreme length from n.e. to s.w., and 21 at its greatest breadth, 513 sq. m.; coast-line, 100 m., mostly rocky, and having many small ports. The surface is a succession of cultivated vales and hills. The hills rise in the West Lomond, 1713 ft., and Largo Law, 965. The chief rivers are the Tay, Forth, Eden (30 m. long), and Leven (16 m.). Fifeshire rests on old red sandstone, with trap rocks in the north, and carboniferous strata, with trap, in the south. There are many coal and iron mines, and lime quarries. The climate is dry, healthful, and mild on the Forth; but the valleys in the n. are much exposed to the full sweep of e. and n.e. gales. The soil is a rich loam, or wet clay on till. The Howe of Fife, on the Eden, is mostly sandy and gravelly, and not very productive. Fifeshire has a greater number of proprietors, gentlemen's seats, and plantations, in proportion to its size, than any other Scotch county, and its coasts are thickly studded with towns and villages. The chief manufactures are linen, floor-cloth, and malt liquors. Fifeshire has 61 parishes. Pop. (1901) 218,840. It returns one member to parliament. The chief towns are Cupar (county town), Dunfermline, St. Andrews, Kirkcaldy, East and West Anstruther, Burntisland, Crail, and Dysart. The ancient 'Kingdom of Fife' was the most cultivated, as well as the most warlike, of Scotch counties. It contains striking monastic, feudal, and palatial ruins of St. Andrews, Dunfermline, Falkland, and Lindores; many Celtic and Roman remains. Many of the events connected with the Scottish Reformation took place in this county, especially at St. Andrews.

FIFTEEN, a. *fĭf′tēn* [*five* and *ten* (see FIVE)]: five and ten. FIF′TEENTH, a. *-tēnth,* the fifth after the tenth; ordinal of 15; in *organs,* a stop tuned two octaves above the diapasons, its lowest C pipe being 2 ft. long. FIFTH,

a. *fĭfth*, ordinal of 5; next after the fourth: N. one of five equal parts; in *music*, an interval of three tones and a semitone. FIFTH'LY, ad. *-lĭ*, in the fifth place. FIFTY, a. *fĭf'tĭ*, five times ten. FIF'TIETH, a. *-ĕth*, ordinal of 50. FIFTH-WHEEL, a flat ring or segment above the fore axle of a carriage and beneath the bed.

FIFTH MON'ARCHY MEN: religious sect in England, holding to one strange form of opinion which the religious and political fermentation of the 17th c. brought to the surface of society, and embodied in sects. The date which has been assigned to their first appearance is 1654. Notwithstanding the ridicule with which they have often been overwhelmed, there seems nothing in their tenets more objectionable than in those of many other sects of the period; and there is no reason to believe that the practices of their leaders exceeded in absurdity, or equalled in impiety, those of Robbins, Reeve, Muggleton, and other apostles of the Ranters. In common with most persons who hold the literal rather than the spiritual interpretation of prophecy, they believe in the four great monarchies of Antichrist marked out by the prophet Daniel; and quite consistently with Christian orthodoxy, they added to them a *fifth*—viz., the kingdom of Christ on earth. So far, there was nothing peculiar in their views. But their error was twofold. 1*st*. They believed in the immediate, or at least in the proximate, advent of Christ (a tenet common to them with the early church); and 2*d*. They held that the fulfillment of God's promise to this effect must be realized by the forcible destruction of the kingdom of Antichrist. Every obstacle which opposed itself to the setting up the Messiah's throne was to be thrown down, and what these obstacles were was a question for the solution of which the only criterion which presented itself was their own fanatical prejudices. It is obvious that such doctrines in such times must have given rise to practical as well as speculative disorder. The sect, never very numerous, became extinct shortly after the Restoration; a fact which, by depriving them of exponents of their own body, has probably exposed them to misrepresentation (Marsden's *History of the later Puritans*, p. 387). In politics, the Fifth Monarchy Men were republicans of the extremest section; and when their conspiracy to murder the Protector, Cromwell, and revolutionize the government, was discovered 1657, their leaders, Venner, Grey, Hopkins, etc., were imprisoned in the Gate House till after the Protector's death. Among their arms and ammunition which was seized, was found a standard exhibiting a lion couchant, supposed to represent the lion of the tribe of Judah, with the motto 'Who will rouse him up?' Neal's *Puritans*, IV. 186. See also Carlyle's *Cromwell's Letters and Speeches*, III. 31.

FIFTH NERVE, the chief sensory nerve of the face, also called trigeminus, or trifacial. It is one of the fifth cranial pair of nerves. The fifth nerve is one of the most

important sensory nerves of the body, its name trafacial meaning that it has three large divisions which are distributed to the face, and its name trigeminus being given because it has three roots inside the skull. It is really a mixed nerve containing both motor and sensory fibres. The motor root rises from a group of cells lying deep in the floor of the fourth ventricle. The sensory portion arises in a series of ganglia, the Gasserian ganglion being the most important one. The ophthalmic and Meckel's ganglia are also smaller ganglionic centres. The chief branches go to supply the entire area of the skin of the face and head, and neuralgias and neuritides of the face and head are due to affections of this nerve. The chief division is the first or ophthalmic division, which supplies the region over the superior surface of the nose, forehead and eye, running as far back as the top of the head. The second branch is the superior maxillary, which supplies the teeth and the region of the skin beneath the orbit, the upper lip, and the region of the temple. The superior maxillary nerve contains a few motor fibres. The third branch, the inferior maxillary, or mandibular, is the largest branch of the fifth nerve, and contains most of the motor fibres. It supplies the surface of the skin of the lower jaw, front of the ear, and temporal region, lying close behind the area supplied by the maxillary. The muscles of the jaw, the masseters, temporals and buccinators are supplied by the motor fibres of this branch.

FIG, n. *fĭg* [F. *figue*—from L. *fīcŭs*, a fig: AS. *fic;* Ger. *feige;* It. *fico*, a fig]: a well-known fruit of a pear-like shape; the tree *Fīcus Cārĭcă* (see below): something of little value or worthless; a snap of the fingers with the arm upraised as a mark of contempt: V. to give a snap of the fingers to or toward. FIG'GING, imp. FIGGED, pp. *fĭgd.* FIG-EATER, same as BECOFICO (q.v.). FIG-MARIGOLD, in *bot.*, common name for the species of the genus *Mesembryanthemum*, belonging to the family *Ficoideæ.* FIG-PECKER, same as FIG-EATER. FIG-SHELL, in *conch.*, a popular name for *Pyrula*, genus of sub-tropical shells, which have a fig- or pear-shaped form with a short spire. They have a wide, sub-tropical range. Forty species have been described, living at a depth of 17 to 35 fathoms. FULL FIG, in *familiar language*, in full dress. A FIG FOR YOU, care nothing for you; contemn and despise you: see FICO. FIG. contr. for FIGURE.

FIG (*Ficus*): genus of trees and shrubs belonging to the nat. ord. *Moraceæ*, and distinguished by having the flowers —male and female mixed—within an almost closed top-shaped, fleshy, receptacle, which enlarges to form the fruit, and incloses numerous one-seeded carpels, inbedded in its pulp. There are more than 100 species, some of them very large trees. Almost all belong to tropical and sub-tropical countries, of the vegetation of which they often form an important feature. They abound in India, in every jungle and hilly situation, to the most northern

Himalaya, and some of them are cultivated about every village. Both *F. religiosa* (the Peepul) and *F. Rumphii* are held in veneration by the Hindus. The most notable species are the Common Fig (see below); the Banyan (q.v.); the Peepul (q.v.), Bo Tree, or Sacred Fig of India; the Sycamore (q.v.); and the East Indian Caoutchouc (q.v.) Tree. The leaves of some species are entire, those of others lobed. Several species of fig show the character for which the banyan in particular has become celebrated, of sending roots straight down to the ground from their spreading branches, and thus multiplying the apparent stems, by which a vast canopy of branches and foliage is supported. The E. Indian Caoutchouc or India-rubber

Common Fig (*Ficus Carica*):

a, male flower, magnified; *b*, male flower, natural size; *c*, female flower, magnified; *d*, female flower, natural size.

Tree is remarkable for the exposure of its roots, which appear in masses above ground, extending on all sides from the base like great writhing snakes. Some figs are creeping or trailing shrubs, with slender stems, covering heaps of stones, or ascending trees like ivy.—Besides the Common Fig, many species yield edible fruits, though none of them are nearly equal to it in value. Among them are the Peepul (*F. religiosa*), *F. Benjamina*, *F. pumila*, *F. auriculata*, *F. Rumphii*, *F. Bengalensis*, *F. aspera*, *F. racemosa*, and *F. granatum*, all E. Indian, also the Sycamore of Egypt.—The milky juice of some species is bland and abundant, as of *F. Saussureana*, which has therefore been ranked among Cow-trees. In other species, the milky juice is very acrid. That of the Common Fig produces a burning sensation on the tongue. That of *F.*

toxicaria, native of the Malayan islands, is used for poioning arrows.—Lac (q.v.) is gathered from some species.—The leaves of *F. politoria* are so rough that they are used for polishing wood and ivory in India. The juice of the fruit of *F. tinctoria* is used in Tahiti to dye cloth: the color is at first green, but being acted on by the juice of a *Cordia*, it becomes bright red. The bark supplies cordage, of which fishing-nets are made.

The Common Fig (*Ficus Carica*) is a native of the East, as the specific name *Carica* (from *Caria*) imports; but it is now cultivated throughout the south of Europe, and is even found naturalized there. Its cultivation has extended also to many warm countries. In the United States, it is seldom seen further n. than Philadelphia; and it is not sufficiently hardy to be common in Britain, though even in Scotland figs may occasionally be seen ripened on a wall; and in the south of England fig-trees are sometimes grown as standards, and a few small fig orchards exist. Protection is always given in some way during winter. Near Paris, and in some other parts of the continent of Europe, fig-trees are so trained that the branches can be tied in bundles and laid along the ground, when they are covered with litter and earth. The fig is a low deciduous tree or shrub, with large deeply lobed leaves, which are rough above, and downy beneath. The branches are clothed with short hairs, and the bark is greenish. The fruit is produced singly in the axils of the leaves, is pear shaped, and has a very short stalk; the color in some varieties is bluish-black; in others, red, purple, yellow, green, or white. The varieties in cultivation are numerous. In warm climates, the fig yields two crops in the year—one from the older wood (midsummer shoots of the preceding year), and a second from the young wood (spring shoots of the same year); but in colder regions the latter never comes to perfection. Fig-trees are propagated by seed, by suckers, etc.; very frequently by layers or by cuttings. Dried figs are an important article of food in the Levant; in more northern regions, they are used for dessert, or for medicinal purposes, being applied to gumboils and other sores, and also administered in pulmonary and nephritic affections, and to relieve habitual constipation. The pulp contains about 62 per cent. of a kind of sugar called *Sugar of Figs*. Figs are dried either in the sun or in ovens built for the purpose. Great quantities are annually exported from the Mediterranean. The best are mostly from Smyrna, and are known as *Turkey figs*, of which those called *Eleme* or *Elemi* are most highly esteemed. Figs of inferior quality are exported in considerable quantities in the form of *fig-cake*, pressed with almonds into cakes somewhat like small cheeses. In the Levant, Portugal, and the Canaries, a spirit is distilled from fermented figs.

FIGARO, n. *fē′gă-rō′*: dramatic character introduced on the Parisian stage 1785 by Beaumarchais (q.v.) in his

Barbier de Seville and *Mariage de Figaro.* These plays, in which Figaro, who coolly outwits every one, is first a barber and then a valet-de-chambre, secured for their author a brilliant reputation not only in France, but also in Germany, where many translations and adaptations of the pieces appeared. Mozart, Paesiello, and Rossini also made them the basis of classic operas. Since their publication, the character of Figaro has stood as a type of cunning, intrigue, and dexterity. After the restoration of the Bourbons, a French literary periodical, distinguished for satirical talent, assumed the name.

FIGEAC, *fē-zhâk':* town of France, dept. of Lot, in a valley surrounded by finely wooded hills on the right bank of the Sellé, 32 m. e.n.e. of Cahors. It is irregular, its streets are narrow, and badly planned, and its houses in general not well built; but the antiquity and quaintness of many of its buildings give it a picturesque and interesting appearance. It has two beautiful Gothic churches, one of them, that of St. Sauveur, has a choir of the 11th, a general superstructure of the 15th, and a modern front of the 19th c. Figeac owes its origin to a Benedictine monastery, founded by Pepin 755. It has some cotton manufactures, and a trade in wine and cattle. Pop. 5,600.

FIGHT, n. *fīt* [AS. *feoht:* Ger. *fechte,* a fight: Swiss, *fechten;* Dut. *vechten,* to struggle]: a battle; a combat: V. to contend for victory; to combat. FIGHT'ING, imp.: N. contention; strife: ADJ. qualified for war; fit for battle. FOUGHT, pt. and pp. *fawt,* did fight. FIGHT'ER, n. one who.—SYN. of 'fight, n.': action; conflict; engagement; contest; struggle; fray; affray; encounter; duel; warfare.

FIGHT'ING FISH (*Macropodus pugnax* or *Ctenops pugnax*): small fresh-water fish, of the family *Anabasidæ* (q.v.), native of the s.e. of Asia, particularly of Siam, where it is commonly kept as goldfishes are in western countries, but on account of its pugnacity, two of these creatures brought together, often rush immediately to combat, or it is even enough to introduce a looking-glass into the water, and the fish hastens to attack its own image. Fish-fights are a favorite amusement of the Siamese; the license to exhibit them yields considerable annual revenue; and an extraordinary amount of gambling takes place in connection with them; not merely money and property, but children and liberty being sometimes staked. The fighting fish has the anal and dorsal fins prolonged into tapering points. When the fish is quiet, its colors are dull; but when it is excited, they glow with metallic splendor, and 'the projected gill-membrane, waving like a black frill around the throat, adds something of grotesqueness to the general appearance.'

FIGLINE, *fē-glē'nā,* or FIGHINE, *fē-ghē'nā:* town of central Italy, province of Florence, 15 m. s.e. from Florence, on the left bank of the Arno. It is surrounded by a rectangular wall, and is traversed by a fine street, through

which passes the great road from Florence up the valley of the Arno. The silk of Figline is the best in Tuscany. Pop. (1901) 11,478.

FIGMENT, n. *fĭg′mĕnt* [L. *figmentum*, a figure, an image—from *fingo*, I form, I feign]: an invention; something feigned or imagined.

FIGO, n. *fī′gō:* for Fig, or Fico, which see.

FIGUEIRA, *fē-gā′ē-râ:* town of Portugal, province of Beira, at the mouth of the Mondego, 23 m. w. by s. from Coimbra. Its harbor is a small bay or estuary of the Mondego, and is safe, but difficult of access for large vessels. It carries, however, considerable trade. The chief exports are salt, wine, vinegar, oil, dried fruits, and oranges. The wine shipped from Figueira is known by the names of *Figueira* and *Bairrada Wine*. It is quite different both from port and from sherry. It is best when new, and does not bear keeping long. Figueira is much resorted to as a bathing-place. Pop. 6,000.

FIGUERAS, *fē-gā′râs:* town in the n.e. of Spain, near the French frontier, province of Gerona, in a fruitful district, 20 m. n.n.e. of the town of Gerona. Its streets are gloomy, but it has beautiful promenades. On a height near the town is the citadel of S. Fernando, strongest fortress of Spain, and key of the Pyrenees on their s. side, with accommodation for 20,000 men. This fortress has been so frequently taken by the French, as to give rise to the saying among the Spaniards, that the citadel of S. Fernando, in time of peace, belongs to Spain, but in time of war to France. Pop. (1900) 10,714.

FIGUIER, *fe-gē-ā′*, Guillaume Louis: 1819, Feb. 15—1894, Nov. 9; French chemist and author; b. Montpellier. He received a scientific education, took his degree in medicine 1841, and removed to Paris 1842. In 1846 he was appointed prof. in the school of pharmacy at Montpellier, 1850 received the degree of physical sciences, and 1853 became a fellow of the school of pharmacy at Paris. He has contributed numerous articles to the *Annals of Science*, *Journal of Pharmacy*, *Scientific Review*, *The Press*, and *France*, and published a large number of works, among them, *Exposition et Histoire des Principales Decouvertes Scientifiques Modernes*, 3 vols. (1851–53); *Histoire du Merveilleux dans les Temps Modernes*, 4 vols. (1859–60); *Vie des Savants Illustres depuis l'Antiquité jusqu au XIXe Siècle* (1866); *Les Insectes* (1866); *Les Articulés* (1867); *Les Oiseaux* (1867); *Les Mammifères* (1868); *L'Homme primitif* (1869); *Les Races humaines* (1871); *Les Merveilles de l'Industrie* (1873–76): *Connais-toi toi-miême*, elements of physiology (1878), and a drama, *Les Six parties du Monde* (1878).

FIG′ULINE: see Potter's Clay.

FIGURANT, n. mas. and Figurante, n. fem. *fĭg′ūrănt* [F. *figurant*, part. of *figurer*, to make a figure]: one of the dancers in a ballet; one who dances in groups or

figures, not coming forward alone, but serving to fill up the scene and form a background for the solo performers.

FIGURATE NUMBERS, in Arithmetic: certain series of numbers originally studied by the Greek geometers in connection with geometric figures, especially polygons and pyramids. Their arithmetical nature will be understood from the following table (the arithmetical triangle of Pascal):

	1	1	1	1	1	1	1	...
	1	2	3	4	5	6	7	...
I.	1	3	6	10	15	21	28	...
II.	1	4	10	20	35	56	84	...
III.	1	5	15	35	70	126	210	...
IV.	1	6	21	56	126	252	462	...
	.	.	.	.	.	.	.	...

The nth number in any row is here the sum of the first n numbers of the preceding row. The figurate numbers proper begin with the third row. The third, fourth, ... rows are called the first, second, ... series of figurate numbers. The table has the interesting property that its diagonals, extending upward from left to right contain the binomial coefficients, i.e., the coefficients in the expansions of $a+b$, $(a+b)^2$, $(a+b)^3$, ...

If instead of the natural numbers 1, 2, 3, ... which form the second row of the table above, we start out with series whose common difference is 2, 3, 4, ... we may form other sets of figurate numbers. Thus:

	1	3	5	7	9	...
I.	1	4	9	16	25	...
II.	1	5	14	30	55	...
III.	1	6	20	50	155	...
	.	.	.	.	.	...

or

	1	4	7	10	13	...
I.	1	5	12	22	35	...
II.	1	6	18	40	75	...
III.	1	7	25	65	140	...
	.	.	.	.	.	...

The name *figurate*, as already intimated, is derived from the fact that the series I. and II. are connected with arrangements of points in a plane or in space. Thus in the following arrangement, obtained by constant

.
. .
. . .
. . . .
. . . . .

enlargement of a triangle, the number of points in the successive horizontal rows is 1, 2, 3, 4, 5, ... and the total number in the first one, two, three, ... rows is 1, 3, 6, 10, 15, ... the series I. of the first table. If the start is made from a square, instead of a triangle,

the resulting numbers are 1, 4, 9, 16, ... being series **I.** of the second table. In the same way series I. of the third table corresponds to the case of a pentagon; and so on. The several series I. are known as the triangular, square, pentagonal, ... numbers, and collectively as polygonal numbers. The series II. correspond in the same way to pyramids in space (e.g., piles of round shot), and are called pyramidal numbers.

The general formula for the *n*th number of the polygonal series for polygon of *r* sides is $\frac{1}{2}[(r—2)n^2—(r—4)n]$; the corresponding pyramidal number is $\frac{1}{12}n(n+1)[(2n+1)(r—2)—3(r—4)]$.

FIGURE, n. *fĭg′ūr* or *fĭg′ėr* [F. *figure*—from L. *figūrā*, shape, an image—from *fingo*, I form: It. *figura*]: shape; form; appearance; a character or shape denoting a number; a mode of expression; a type; an emblem; a diagram; the steps or movements in a dance; in *art*, a representation of the human body; in *rhet.*, mode of speaking in which words are turned from their ordinary sense—usually termed figure of speech; in *logic*, the arrangement of the middle term of a syllogism with the two terms of the conclusion, (see MOOD and LOGIC), in *familiar language*, price or value: V. to shape or form; to represent; to make a figure. FIG′URING, imp. FIG′URED, pp. *-ėrd:* ADJ. adorned with figures or ornaments. FIGURED BASS, in *music*, a bass part with figures placed over the notes, which indicate the harmony to be played to each note, and serve as a guide to the accompanist, invented in the 17th c. by Ludovico Viadana. FIGURED-COUNTERPOINT, in *music*, several notes of various lengths, with syncopations and other ornamental lengths set against the single notes of the canto fermo. FIGURED-MELODY, in *music*, the breaking up of the long notes of the church melodies into larger or more rapid figures or passages. FIG′URABLE, a. *-ū-ră-bl*, capable of being brought into a fixed shape. FIG′URABIL′ITY, n. *-bĭl′ĭ-tī*. FIG′URAL, a. *-răl*, pertaining to figures. FIGURATE, a. *fĭg′-ū-rāt*, of a certain and determinate form. FIGURATE NUMBERS (see above). FIG′URATELY, ad. *lĭ*. FIG′URATIVE, a. *-ră-tĭv*, not real; representing something else; typical; abounding in figures or metaphors. FIG′URATIVELY, ad. *-lĭ*, in a sense different from the usual sense. FIG′URATIVENESS, n. GRAMMATICAL FIGURE: see METONYMY: SYNECDOCHE. RHETORICAL FIGURE: see METAPHOR. FIGUREHEAD, a carved ornament in human or other form at the prow or fore-part of a ship. FIGURE-STONE, a variety of talc or soapstone (see SOAPSTONE). TO CUT A FIGURE, to make a show; to attract attention.—SYN. of 'figure, n.': outline; structure; conformation; configuration; image; mold; fashion; metaphor; simile; similitude; representation; statue; drawing; pattern; design; conduct; career; a number; a digit; value; price; representative; a trope.

FIGWORT, n. *fĭg′wėrt* [*fig* and *wort*]: a wild roadside plant with small flowers; indigenous to N. America and Europe: the knotted figwort, formerly deemed a remedy for scrofula, is *Scrophulāriă nodōsă*, ord. *Scrophulārĭācĕæ*.

FIJI ISLANDS.

FIJI, *fē'je* (or FEEJEE, or VITI, *vē'tē*) ISLANDS: archipelago of about 250 islands in the s. Pacific Ocean; lat. 15° 30′—20° 30′ s., long. 177° e.—178° w.; total area 8,034 sq. m., almost equal to the area of Mass.: since 1874 a dependency of the British empire. The group was discovered 1646 by the Dutch navigator Tasman. The largest of the group, Viti-levu, or Big Viti, has 4,479 sq. m.; Vanua-levu, 2,486 sq. m.; and all the other islands together, have 1,069 sq. m. The islands are of volcanic origin, and though there are no longer any active volcanoes, yet hot springs, numerous earthquakes, and other signs testify that the subterranean forces are not quite extinct. All the islands are coral-girt; and to the approaching navigator appear clothed to their very summits with a dense and luxuriant vegetation. The surface is generally hilly, and the soil, owing to abundant rain, is very productive. The windward sides of the islands are covered with thick forests, while to the leeward is a grassy country dotted here and there with screw-pines. The natural productions of Fiji or Viti are very varied, and the vegetation is, on the whole, tropical. The mountain districts are well adapted to the growth of coffee; rice can be grown in marshy land; the soil is well adapted for the sugar-cane, while cotton, tobacco, sweet potatoes, yams, arrow-root, maize, bread-fruit, plantain, the sago and coca palm, with other tropical productions, all thrive. These islands require only to be well worked by the capitalist to yield a golden harvest, as the coffee, cotton, and sugar industries are capable of extensive development. In 1880 there were at least seven sugar-mills at work, the product ranking well in the market. Of the plants yielding oil and fat, the most valuable is the cocoa-nut palm; the oil, copra, or dried nuts of which always command a good price. Each tree produces about 100 nuts, and is worth $1 to $1.50 a year to its proprietor. Edible roots are abundant, bread being made from them; but the yam is the staple article of food, by the ripening season of which the natives regulate their calendar. Timber suitable for house and ship building abounds. Copper, antimony, plumbago, and gold in small quantities have been found. Pearl fish exist in innumerable quantities near the coral-reefs, and fish and turtle are plentiful. There seem to be no indigenous animals; such live-stock as pigs, dogs, cattle, sheep, and fowls have been imported. In 1901 there were on the islands 2,455 horses, 24,320 horned cattle, 1,210 sheep, and 14,860 goats. Many herds of swine run wild in the forests. There seems a promising improvement recently noticeable in the prosperity of the islands. In 1901 the total exports consisting principally of sugar, copra, fruit, distilled spirits, bêche-de-mer, maize and vanilla amounted to $2,744,025, and imports, of which the principal item is under the heading of 'drapery,' $1,755,910. The chief articles of export are sugar (increasing), copra, cotton (not increasing), fruit, maize, coffee, cocoa-nut fibre, candle-nuts; while the imports embrace Manchester goods,

ironmongery, cutlery, wine, beer, spirits, groceries, etc. There are excellent harbors, among which that of Levuka, the largest town, situated on Ovalau, lately provided with a lighthouse, is most important. The capital is Suva, in the s. of Viti-levu.

The native inhabitants are for the most part Melanesians, with dark complexions and long frizzly hair; but considerable intermixture has taken place with the Polynesians of Tonga and Samoa, who have to some extent modified both the customs and language of the Fijians. They are tall, muscular, and well built, with regular features. They are very cleanly in their habits, and love the water. When first known by Europeans, they were in some respects civilized; but till lately human life was recklessly wasted, and nowhere was cannibalism so important an institution as here. The Fijians had priests, temples, a complex theology, and a firm belief in a future state.. Human sacrifices were very common; and not merely enemies and strangers were slain to be eaten, but even wives, children, and friends were ruthlessly murdered and cooked. This state of things was in full force till about 1854. In 1835 the first Wesleyan missionaries landed on one of the FiIi Islands. Now, marvellous to relate, the bulk of the inhabitants are professing Christians, the only heathens being a few thousands in the interior of Viti-levu. Sir Arthur Gordon has declared that the Fijians are a Christian people. More than 102,000 are regular attendants at Wesleyan chapels; several thousands are Rom. Catholics; and other Christian churches have agencies here. The converts are said to be peaceable, well-behaved people. Cannibalism has disappeared since 1878; polygamy also has ceased; and peace seems everywhere to prevail. More than 800 churches have been built; and education is zealously promoted. Several interesting works on Fiji have lately been published, of which the more notable are *At Home in Fiji*, by Miss Gordon Cumming (1881); *A Year in Fiji*, by J. Horne (1881); and *Coral Lands*, by H. S. Cooper (1880).

The later history of Viti has been very tumultuous. In 1855, Thakombau, chief of Bau, was made responsible for a debt due from the natives to the Americans; and this resulted in his election to the dignity of 'Tui Viti,' or king of Viti. In 1857 he offered to cede Viti to Great Britain, in consideration of the payment of his debt to America, stipulating only for the retention of his title and authority over the natives. This offer was refused by the British government 1862, after sending out a deputation. A 'Polynesian Company' was then started, which undertook to clear off the debt, in return for certain valuable privileges, but ultimately collapsed. In 1869 the pres. of the United States refused the protectorate of the islands. From that date till 1873, the government sanctioned three or four unsuccessful constitutions. The cession of the islands to Britain was renewed 1873, and accepted, and 1874, Sep. 30, they were annexed as a crown colony. The small island of Rotumah (q.v.), annexed by Britain 1880, is now

attached to the Fiji group. Pop. (1901) 117,870 of all classes.

FILADELFIA, *fē-lâ-dĕl'fē-â:* town of s. Italy, province of Catanzaro, 18 m. w.s.w. from Catanzaro, on the w. side of the Apennines, and on a branch of the Angistola. Pop. 5,700.

FILAGO, n. *fī-lā'gō* [L. *filum,* a thread: from the delicate threads or *fila* which cover the plant]: in *bot.,* cudwort, genus of composite plants, chiefly annuals.

FILAMENT, n. *fĭl-ă-mĕnt* [F. *filament;* OF. *filamens,* a filament—from mid. L. *filamĕn'tum*—from L. *filum,* a thread: It. *filo;* F. *fil,* a thread]: a thread; a fibre; in *bot.,* the stalk which supports the anther. FILA'CEOUS, a. *-ā'shŭs,* consisting of threads; composed of threads or thread-like fibres. FIL'AMEN'TOUS, a. *-mĕn'tŭs,* thread-like; bearing filaments. FIL'AMEN'TARY, a. *-tėr-ĭ,* formed by filaments. FILAMEN'TOID, having the appearance of a filament; like a filament. FIL'ATORY, n. *-tėr-ĭ,* a machine which spins thread. FIL'IFORM, a. *-ĭ-fawrm* [L. *forma,* shape]: slender like a thread. FILATURE, n. *fĭl'ă-tūr,* spinning, especially of silk from the cocoon. FILAR, a. *fī'lėr,* of or pertaining to a thread: specifically applied to a micrometer, microscope etc., having threads or wires across its field of view. FILOSE, a. *fī'lōs,* ending in a thread-like process.

FILAMENT LAMP: see ELECTRIC ILLUMINATION.

FILANDER, n. *fĭ-lăn'dėr* [L. *filum,* a thread: from the slenderness of the tail]: species of short-tailed kangaroo (q.v.).

FILA'RIA: see GUINEA-WORM: THREAD-WORM.

FILARIASIS, infection with worms of the genus *Filaria.* The principal diseases caused by the presence in the tissues of these worms are elephantiasis chyluria, or the discharge of a milky fluid in the urine, and craw-craw, a pustular eruption affecting the nations of the West Coast of Africa. There are many varieties of filariæ, the one usually referred to being *F. bancrofti.* This species, like many other vermin as parasites, has two hosts —man and the mosquito. The adult worm inhabits the lymphatic vessels. The embryos migrate to the blood vessels, but are found in the blood during the night only, disappearing in the morning. Their development takes place in the body of the culex mosquito which is infected with them by sucking the blood of man. How the developed embryos find their way again into the body of man is not known, but it is supposed to be through the drinking water. Fifteen or more species have been found parasitic in man, and a number of others infest animals—horses, dogs, cattle, cats, and others. Some of these have also been found to require two hosts for their full development, as the rat and the cockroach, the dog and the flea, the duck and the small shell fish. Some affect man alone or one of the lower animals alone, others are equally at home in either. Filariæ are thread-like in form about

$\frac{1}{100}$ to $\frac{1}{25}$ inch in diameter, but the different species vary greatly in length, from a fraction of an inch to as much as six feet or even more.

FILCH, v. *fĭlch* [Swiss, *flöke*, to bear away secretly: Norw. *pilka;* Scot. *pilk*, to pick: Gael. *peallaid*, the skin of an animal (see PILCH)]: to steal something of little value; to pilfer. FILCH'ING, imp.: N. the act of stealing in a petty way. FILCHED, pp. *fĭlcht*. FILCHER, n. one who. FILCH'INGLY, ad. *-lĭ*. *Note.*—Skeat prefers the derivation of *filch* from Icel. *fela*, to hide, to conceal: Goth. *filhan*, to hide, to bury.

FILE, n. *fīl* [F. *fil*, a thread: OF. *file*, a rank, a row—from mid L. *fila*, a string of things—from L. *fĭlŭm*, a thread]: a line or wire on which papers are strung for preservation and reference; the number of papers so strung; a bundle of papers tied and titled: a row of soliders ranged one behind another, as *rank* means a row of men ranged one beside another; but, generally speaking, two soldiers, the front and rear rank man, as in the ordinary formation at the present day a battalion stands two deep: the term is applied sometimes to one man in a single rank: a row; a series; a list: V. to range along a thread or string; to fasten together, as paper on a wire for preservation; to place officially among the records of a court. FI'LING, imp. placing on a string or in a bundle, as papers; marching in file, as soldiers. FILED, pp. *fīld*. TO MARCH IN FILE, to follow one after another, and not abreast. RANK AND FILE, the body of private soldiers composing an army. FILE-FIRING, firing guns by one file at a time.

FILE, n. *fīl* [Dut. *vijl;* Dan. *fül;* Sw. *fil*, a file: O.H.G. *figila*—from *figen*, to rub: Bohem. *pila*, a saw—from *piliti*, to saw]: a steel tool with a toothed or ridged surface for reducing, smoothing, or cutting any article, usually an article of metal: V. to rub or smooth with a file; to wear off by friction. FI'LING, imp. FILED, pp. *fīld*, worked by the file; polished. FI'LER, n. one who FILE-BLANK, piece of soft steel, shaped and ground ready for cutting, to form a file. FILE-CARRIER, tool-holder used to mount a file. FILE-CLEANER, scratch-brush of wire for cleaning files. FILE-CUTTER, one who makes files. FILE-FISH, same as Balistes (q.v.). FILE-SHELL, in *conch.*, bivalve mollusk of the genus *Pholas*. FILE-STRIPPER, machine for smoothing a worn-out file, preparatory to re-cutting. FI'LINGS, n. plu. *-lĭngz*, particles rubbed off with a file.

FILE, n. *fīl* [Gael. *file*, a bard, a poet—in the sense of an accomplished clever person (see FILE 2)]: in *OE.* and *modern slang*, an odd fellow; a clever person; a cheat.

FILE, v. *fīl* [contr. of *defile*, which see]: in *OE.*, to defile. FIL'ING, imp. FILED, pp. *fīld*, defiled; polluted.

FILE—FILING: a tool for rasping:—the act of applying it. A FILE is a steel tool, having its surface covered with teeth or serratures, and used for cutting down and shaping metals and other hard substances. There is little doubt that in the earliest stages of metal-working, when bronze

implements first superseded those of stone, rough stones were used for the purposes to which files are now applied; nevertheless, the use of files dates from high antiquity. They are mentioned in the Old Testament, I. Sam. xiii. 21; also in the *Odyssey*. Files are almost every conceivable shape, to suit the very varied purposes to which they are applied—flat, square, round or *rat-tail*, triangular, half-round, feather-edged, etc., besides being variously bent for intricate work. Nearly all these files are made thicker in the middle, or 'bellied,' the object of which will appear below. Files require to be made of the very best steel, which is first forged into the required shape, known as a 'blank,' then finished more accurately to the required form by grinding, planing, or filing. The blanks thus prepared and well softened (see TEMPERING) are next handed to the cutter, who sits astride on a low bench or stool, and has before him a stone anvil, with a flat piece of pewter laid upon it. The blank is held upon the anvil, with its tang toward the cutter, by means of a long loop of leather strap, into which the cutter places his foot. He then cuts the teeth by striking with a hammer a short stout chisel, held obliquely at an angle of about 12° or 14° from the perpendicular. The object of this will be easily understood; for, if the chisel were perpendicular, a furrow like the letter V would be indented, and an equal burr struck up on each side; but instead of this, a cutting tooth like that of a saw, but with less obliquity, is required; this is effected by the obliquity of the chisel, and a burr is thrown up on one side only—viz., toward the tang. The surprising regularity observable in the distance between the teeth is secured in this way: The cutting is commenced at the point of the file; the chisel is then drawn backward, laid upon the blank, and slid forward, till it reaches the burr raised by the last cut; the blow is now struck, and another tooth and burr produced, which serves as a guide for the next cut; and so on. The distance between the teeth thus depends on the force of the blow and the obliquity of the cut; for the heavier the blow, the greater the ridge or burr, and the obliquity determines the distance of the cut from the burr; the skill of the workman consists, therefore, in the precise regulation of the blows. Most files are double cut—that is, they have two series of *courses* of chisel-cuts, which are oppositely inclined at an angle of about 55° to the central line of the file. The second course is made in the same manner as the first, but with lighter blows, and is usually somewhat finer than the first. This angular crossing converts the ridges into pointed teeth. Files used for soft metals which are liable to clog the teeth are single cut—that is, they have but one course of cuts. Taper files have the teeth finer toward the point. Rasps for wood are cut with pointed chisels; each tooth being an angular pit with a strong burr, instead of a long furrow. The newly cut teeth in the soft steel are preserved from injury by being laid upon the softer pewter block before referred to. The rapidity with which the blows are struck varies with the

fineness of the file; 60 or 80 cuts are commonly made per minute.

Files have to be carefully hardened and tempered. If heated too strongly, or made too hard, the steel is so brittle that the teeth tear off, if too soft, they wear down rapidly, and the file soon becomes useless. Great care is required also in keeping them straight, as the sudden cooling necessary for hardening is very apt to warp the steel. At first sight, it would appear, from the simplicity and continual repetition of the movements required in file-cutting and the precision and regularity of the work, that it is an operation specially adapted for machinery. Many attempts have been made to cut files by machinery, but with only partial success; the chief difficulty arises from the necessity of modifying the force of the blow to suit the hardness of the steel. It is practically impossible to supply a large number of blanks all of exactly the same hardness; and if the machine be adjusted to suit the hardness of one blank, it may strike too heavy or too light a blow for the next; whereas the workman *feels* at once the hardness of the steel he is working upon, and adjusts his blows accordingly.

Filing, to the unintiated, may seem a simple operation of rubbing one piece of metal on another, requiring only muscular strength and no skill. This is far from being the case, for a skilful workman will, in a given time, with a given amount of muscular work, cut away a far greater quantity of metal with a file than one who is unskilful, for he makes every tooth *cut into* the work, instead of *rubbing over* it. To do this he must adapt the pressure and velocity of motion of the file to the coarseness of its teeth, and the hardness, brittleness, and toughness of the material he is working upon. To *file flat*, that is, to avoid rounding the sharp edges of a narrow piece of work, is very difficult, and some years of continual practice, are required before an apprentice can do this well, especially in 'smoothing up' or finishing work before polishing, and there are some who never succeed in filing, smoothing, and polishing without rounding the edges of fine work. The power of doing this constitutes the main test of skill among mathematical instrument makers and other metal-workers. The flattest surface can be obtained by laying the work, where its form admits, upon a piece of cork held in the vice, and filing it with *one hand*, the pressure on the file being communicated by the forefinger. It is mainly to aid the workman in filing flat that the rounded or bellied form is given to files: this partially compensates the tendency of the hands to move in a curved line with its convexity upward when they move forward and apply pressure, as in the act of filing.

FILE-FISH: see Balistes.

FILEY, *fī'lĭ:* watering-place on the Yorkshire coast, England, eight m. s.e. of Scarborough. A promontory shelters the bay from n. winds; and F. has been recom-

mended as a good place for a great harbor of refuge. Pop. (1881) 2,337; (1901) 3,003.

FILIAL, a. *fĭl′ĭ-ăl* [F. *filial*—from mid. L. *fĭlĭālĭs*—from L. *filĭŭs*, a son, *filĭă*, a daughter], pert. to a son or daughter. FIL′IALLY, ad. *-lĭ*. FILIATION, n. *fĭl′ĭ-ā′shŭn* [F.—L.]: relation of a child to a father; correlative of paternity; the act of ascribing a child to a father; affiliation: in the *law of Scotland*, process by which the paternity of a child is determined. The general rule that the father is he whom the marriage points out (*pater est quem nuptiæ demonstrant*), is a presumption which may be overcome by showing its impossibility in fact in the specific case. See EVIDENCE: SEMIPLENA PROBATIO. FILI′ETY. *ī′ĭ-tĭ*, sonship.

FILIBUSTER, or FILLIBUSTER, n. *fĭl′ĭ-bŭs′tẽr* [F. *flibustier*, a freebooter: Sp. *filibuster*]: one who unites with others in attacking a foreign country in time of peace for plunder or conquest; a marauder; a freebooter—see *Note* under FREE. F.—meaning a sort of piratical adventurer, but acting sometimes under a pretense of seeking some public good—may be regarded as the modern designation, especially in the United States, for one of the class known formerly as *Buccaneers* (q.v.). *Note.*—FILIBUSTER is said to be from the Sp. *filibote*, of *flibóte*, a fly-boat, which the Spaniards adopted from the Eng. *fly-boat*, of which it is a mere corruption.

FILIBUSTERS, American: the word 'filibuster' is of Spanish origin, having been in common use as 'filibustero,' in that country, long before its adoption into the English language. It is defined by Roche, in his *Story of the Filibusters* (1891). 'A citizen or subject of any country,' he says, 'who makes war upon a state with which his own is at peace, with intent to overrun and occupy it, and not merely for the piratical ends of rapine and plunder, is a filibuster.' In accordance with the law of nations such an act of war is a crime against both countries. 'Its morality, before the meaner courts of popular judgment,' Roche adds, 'will always rest upon the measure of its success alone.' In other words, the only difference between a filibuster and a conqueror is the same distinction that exists between failure and success.

Although filibustering in America began very early in the 19th century, nearly another half-century passed before this term was actually applied to these expeditions of adventurers. Thus, while Don Francisco Miranda, Aaron Burr, and the victims of the Mina and the Alamo, were filibusters in the strict sense of the word, they were never kown by this title. Neither was Houston, whose victory over Santa Ana has the distinction of being the only successful filibustering expedition in which Americans have participated.

The first adventurer to be commonly known as a filibuster was Narciso Lopez, who commenced the efforts to free Cuba in 1849. Lopez was a Venezuelan, who had

fought so bravely in the Spanish Army that he had attained the rank of Major-General, with an appointment as governor of Valencia. In 1843, he went to Cuba, where, after having been loaded with honors, he eventually fell into disfavor, and was obliged to take refuge in the United States. Here he found many adventurous spirits who sympathized with him, and, among them, he met with little difficulty in securing a following.

The first attempt to invade Cuba was made in 1849, August, but, as a warning of the enterprise was received in Washington before the vessel sailed, the entire party were arrested by United States marshals. In spite of this set-back, Lopez almost immediately began his enlistment of men for a second expedition, and this sailed 1850, April 25, Col. Theodore O'Hara, author of the *Bivouac of the Dead*, being in charge of one detachment. Owing to the failure of the natives to participate in the uprising, it met with no success, however. Fourteen were killed, including the chaplain, and 30 were wounded Lopez, who was arrested at Key West, upon his return, was tried for violating the neutrality laws. He escaped conviction, and, at once set about organizing another expedition. In 1851, Aug. 12, therefore, he landed another force at Bahia Honda, where he had been informed that he could depend upon a general uprising. Again he was disappointed, however, and, although he was able, with a force of less than 325 men, to repulse more than 1300 of the enemy, killing their leader, Gen. Enna, he was eventually compelled to retreat. Exposure and desertion rapidly depleted his forces, and he was at last captured without much difficulty. Fifty of his followers were shot, and he was strangled by the garrote, 1851, Sept. 1. The second detachment of the Lopez forces, with Col. W. S. Crittenden, who was in command, were captured at sea, and taken to Havana, where, after a mockery of a trial, they, too, were adjudged guilty, and shot. At the moment of execution Crittenden refused to kneel. 'An American kneels only to his God,' he announced, so, with arms crossed, he unflinchingly faced the firing party.

The treasure hoards of Northern Mexico was the *ignis fatuus* in pursuit of which so many brave Californians imperilled their lives and liberty during the early 50's. Prominent among these adventurers were the French emigrants who had come to this country in search of wealth, but who, having been expelled from their claims by the mining laws, had found every avenue of legitimate occupation closed to them. To such men, therefore, these tales of limitless wealth to be secured in Sonora, and other parts of Mexico, brought new hope. As the result they were only too eager to test their fortunes in this new field.

One of the most enthusiastic was Count Gaston Raouix de Raousset-Boulbon, who had come to California after a mose remarkable career as a journalist and politician in France. In its inception, Raousset's project was more

in the nature of a colonizing scheme than it was a filibustering expedition. In arranging his plans he had the full approval of President Arista of Mexico, the tacit support of the French Government, and the financial aid of the banking house of Jerker, Torre & Co. Assured of such substantial backing, he had no difficulty in enlisting followers, and it was with 260 men that he landed at Guaymas, 1852, June 1. There he was received with open arms by the populace, but so coldly by the governor, General Blanco, that he immediately became suspicious. The truth was that Blanco, while the Mexican governor of Sonora, was also financially interested in the efforts of a British company to gain possession of the country. To offset Raousset's efforts, therefore, he not only failed to fulfill the government's contract with the colonists, but also placed so many legal obstacles in their way, that they finally announced their determination to fight rather than submit to such humiliating treatment. On Oct. 14, therefore, they attacked Blanco and his forces at Hermosillo, and drove him from the town.

Raousset would have followed this victory with other operations, if serious illness had not prevented, but while he was unconscious, his followers made a treaty with Blanco, by which they agreed to leave Mexico upon receipt of $40,000. As the leader was not a party to this agreement, nor a sharer in the proceeds, he steadfastly refused to comply with the arrangements. In 1853, after the downfall of Blanco, he was invited by Santa Ana to head another colonizing enterprise for the protection of Mexico, and, to this suggestion he gladly agreed. Before he could get to Mexico with his colonists, however, Santa Ana had commenced to regret his contract, so, when he again landed at Guaymas, things were made so unpleasant for him that it was impossible for him to hold his followers in check. This attack, while conducted with great bravery, was also disastrous, but it was not until more than a third of their number had fallen that the Frenchmen could be persuaded to surrender, and their agreement to lay down their arms was at last obtained only upon the assurance that the lives of all, including Raousset, should be spared. In spite of this treaty, however, the leader of the little band was shot to death 1854, Aug. 12, and Mexico has never made an effort to explain this inhuman violation of the peace terms.

The attempt of Henry A. Crabbe, an ex-senator of the State of California, to secure possession of Sonora, in 1857, was no more successful. Although invited to lead his expedition into that country, he learned, like those who had suffered before him, that a Mexican promise was not to be relied upon. On April 1 he was fired upon by the Mexican forces, and the battle that followed lasted for eight days. Finally he surrendered, under promise of immunity, but, an hour after this guarantee of safety had been given, their sentence of death was announced, and, at daybreak, they were shot.

FILIBUSTERS.

The last and greatest of the American filibusters was William Walker, a man who, for about ten years, occupied one of the most picturesque positions in American public life. Born in Tennessee, 1824, May 8, he was educated in the public schools and then at the Univ. of Nashville. Originally intending to be a clergyman, he finally lost much of his interest in the church, and entered upon the study of medicine. In this he was successful, and, after studying for some years in the universities of Europe, he practiced, both in Nashville and in Philadelphia. Eventually, because of ill health, he went to New Orleans, where he studied law, and was admitted to the bar. Instead of devoting his attention to his legal pursuits, however, he secured a position upon a newspaper and soon became known as one of the most verile writers in the South. In 1849, he removed to California, where he became the editor of the San Francisco Herald, a position that involved him in no end of trouble, as his frequent appearance on the 'field of honor' indicated.

Walker's first attempt at filibusterism was made in 1853, when he decided to capture Sonora, that he might use it to extend the 'area of slavery,' a system in which Walker was a fanatical believer. As he was thus able to invoke the financial support of the rich slave-holding element, he was soon able to enlist a company of men, and to charter a brig for their transportation. They were destined, however, never to reach the scene of action, for, on the very day set for their departure, or, in 1853, July, the vessel was seized by the United States marshal. Nothing daunted, Walker continued to recruit his little army, and, on Oct. 28 a company of 45 men succeeded in stealing away from San Francisco in the bark Caroline. On. Nov. 3 they captured the town of La Paz, making the governor, Espanosa, a prisoner, and when, three days later, Col. Robollero arrived to supersede the governor, they also captured him. At an election, which was held immediately, Walker was chosen president, and the government was established upon as firm a basis as was possible with such a small number of men. Two months later, Walker issued a proclamation officially annexing the entire province, but this conquest was fated to be a conquest in name only, for it was not many months before Walker, with the defeated and thoroughly disheartened remnant of his army, marched across the line into United States territory and formally surrendered as prisoners of war to Major McKinstry. Walker was tried for violation of the neutrality laws, but was acquitted.

Unable, after this taste of adventure, to settle down to the calm pursuits of private life, Walker soon became interested in the political situation in Nicaragua, and when Castellon, the leader of the Radical party, invited him to aid him in securing control in that country, he was not slow in accepting the invitation. In 1855, May 4, Walker, with 56 men, sailed from San Francisco, on the brig Vesta, and, upon their arrival, they were promptly

accepted into the military service of Nicaragua under the name of the 'American Phalanx.' Without much trouble the new recruits won several victories, including the capture of Grenada, and, upon the death of Castallon, Walker had himself appointed commander-in-chief of the army.

From that day he became master of the field, and, when, in 1856, his provisional president, Rivas, turned against him, Walker succeeded in making himself President. It was then that he began to carry out his plan for the institution of a great military state to include the whole of Spanish America. Having assured himself of the wealth of the country, he resolved to keep it as an independent nation, with himself as its ruler, instead of turning it over to the American capitalists who had expected him to cede it to them. As the result, he inaugurated a system of taxation, both over the country and on the traffic of the lake. He seized the famous gold mines of Chontales, and, in other ways, assumed such an arbitrary control over affairs that it was not long before the people of the neighboring states rose in arms against him. For nearly two years, however, he remained master of the situation, and when, in 1857, he was finally compelled to capitulate, at Rivas, he still maintained the right to the title of President of Nicaragua.

Within a few months, however, he had collected another small force of adventurers, and, chartering another craft, he set sail for Central America once more. Arriving at San Juan, he held his position so successfully that he would probably have succeeded in re-seating himself in the presidential chair if, on Dec. 6, the United States frigate Wabash had not appeared in the harbor. In spite of his protests he was arrested by Commodore Paulding, and was taken back to the United States.

That this action was illegal, there can be little doubt. Even President Buchanan, who was not at all in sympathy with Walker, refused to approve of the course adopted by the American commodore, and the adventurer was set at liberty. For some time he attempted to make the United States responsible for the mistake of its navy, but the Government not only refused to reimburse him, or reëstablish him in the position from which it had taken him, but, in 1858, when he was endeavoring to enlist men for a new expedition, President Buchanan issued a proclamation, calling attention to the proposed project, and warning the people that Walker would not be permitted to carry it into effect.

Despite this opposition Walker succeeded in recruiting more than 150 men, and 1858, Dec. 1, he sailed from Mobile, Ala., but, meeting with shipwreck, they were picked up by a British war vessel, and brought back to the United States. In 1859, Sept., he made another unsuccessful attempt to sail for Nicaragua, but, in 1860, Aug., he outwitted official vigilance and landed a force on the eastern coast of Honduras. Again success was promised, but, at the critical moment in his campaign,

the British steamer Icarus appeared, and its commander, Capt. Salmon, demanded his unconditional surrender. While Walker's acceptance of this proposition was secured only upon the assurance that he was surrendering to Great Britain, and not to his enemies, the British officer promptly broke faith with him and turned him over to the Hondurans. By them he was tried, found guilty, and executed 1860, Sept. 12.

FILICAJA, *fē-lē-kâ'yâ*, VINCENZO: 1642–1707, Sep. 24; b. Florence, of an ancient but impoverished family: lyrical poet. A disappointment in love, in his youth, led him to turn from amatory poetry to heroic, martial, and sacred themes. These odes, published in Florence, 1684, made him famous, and procured for him the liberal patronage of Queen Christina of Sweden. Patriotic sonnets—grandest among which is his lament over Italy—*Italia, Italia, O tu cui feo la sorte*—and heroic odes, severely classic in form, are the chief works of Filicaja. In advanced age, he was appointed judge and senator, and 1702 was called to one of the highest magisterial offices in Florence, where he died. His works, under the title of *Poesie Toscane di Vincenzo da Filicaja, Senatore Fiorentino e Accademico della Crusca*, were published after his death. The best edition is that of Venice (2 vols. 1762), containing both the Italian and Latin verses of the author.

FILICES, n. plu. *fĭl'ĭ-sēz* [L. *filix*, a fern, *filĭcēs*, ferns]: the fern-tribe (see FERNS). FIL'ICAL, a. *-kal*, of or pertaining to the Filices, or Ferns: as the *Filical* Alliance. FILICA'LES, *-kā'lēz*, an alliance of Acrogens, containing the Ferns. FIL'ICOID, a. *-koyd* [Gr. *eidos*, form]: resembling a fern. FILICITES, n. plu. *fĭl'ĭ-sītz* or *fĭl'ĭ-sī'tēz*, fossil ferns. FILICIC ACID, the dibutyric ether of phoroglucin.

FILIFORM, a.: see FILAMENT.

FILIFORMIA, n. *fĭl-ĭ-fawr'mĭ-a:* in *zool.*, one of the two sections of crustaceans into which the order *Læmodipodia* is divided. They are distinguished by their long threadlike body and slender legs.

FILIGREE, n. *fĭl'ĭ-grē* [F. *filigrane*—from It. and Sp. *filigrana*, a kind of texture made of gold or silver wire—from *filo*, wire; *grano* the direction of fibres of wood: L. *fīlŭm*, a thread, *grānum*, a grain]: very fine ornamental threadlike work made of gold or silver wire, which is twisted into spirals and other convoluted forms; and these spirals, etc., are combined to form a sort of metallic lacework, which is shaped into brooches, earrings, crosses, head ornaments, and others of a very light and elegant character. This work is chiefly done in Malta, India, Genoa, the Ionian Islands, and some parts of Turkey. It sometimes receives the general name of *Maltese work*.—F. work is of great antiquity: it has been found in the tombs of Thebes; and specimens of Greek and Etruscan work, 3,000 years old show perfect execution. The art was highly developed in central Asia also from the most remote times. The Irish filigree work reached its perfection in the

10th and 11th c.: beautiful specimens are in the Royal Irish Acad. at Dublin, and the 'Tara Brooch' is well known. FILIGREE, in *sculp.*, fine threadlike work. FILIGREED, a. ornamented with filigree.

FILIOQUE, *fĭl-ĭ-ō'kwē* (in English 'and from the Son'): an addition to the original statement of the Nicene Creed. The first general council (at Nicæa 325), called with special reference to the controversy concerning the divinity of Christ, naturally gave that subject its chief attention. Consequently the creed that it adopted, while declaring the Son to be of one substance with the Father, simply affirmed faith also in the Holy Spirit without attempting to define his essential being. But subsequently earnest discussions concerning the Holy Spirit were greatly multiplied and prepared the way for his being described by the second general council (at Constantinople 381) as the Spirit 'proceeding from the Father.' These words of Christ where assumed to refer to the Spirit's essential being and consequently to teach that the source of that is in the Father only. Though this was the prevailing view in the Greek Church, among the Latins the tendency was to say that the Spirit's proceeding or issuing forth is also from the Son. This, Augustin affirmed, and by his great influence, did much to establish. At length, 589, the synod of Toledo (not a general council) added the words 'filioque' to the creed. This addition pope Leo III. in 809, against the arguments and entreaties of Charlemagne, refused to sanction though he affirmed the doctrine sound and Scriptural. When, two centuries later (1014), the papal assent was yielded the addition was not made in writing, but was chanted during high mass at the coronation of Henry II. In the Eastern Church the clause was rejected, though some eminent men admitted that the procession of the Spirit from the Father is through the Son. After the schism between the East and the West (accomplished in the 11th c. and of which the doctrinal difference expressed by the addition of 'filioque' to the creed was one of the causes), repeated efforts to effect a reconciliation were made without success. Yet both churches profess belief in the existence and divinity of the Holy Spirit, and, on that subject, differ from each other only in their attempts to express mysteries concerning which all human minds are equally ignorant. Since the Reformation, Protestant churches accept the creed with 'filioque' retained. They who would rightly estimate this controversy must bear in mind that the words on which it is founded, 'who proceedeth from the Father' are understood by many as referring only to the mission of the Spirit among men and consequently as not revealing anything concerning the essential relation of the Spirit to the Father or the Son.

FILIPEN'DULOUS, a.: hanging or suspended by a thread; in *bot.*, seemingly suspended by or strung on a thread; applied to tuberous swellings in the middle or at the extremities of slender threadlike rootlets.

FILIPO-D'ARGIRO, *fē-lĭp'pō-dâr-jē'rō*, SAN: town of Sicily, province of Catania, about 30 m. w.n.w. of the town of Catania; on the right bank of the Traina, in an exceedingly fertile district. It contains a ruined Saracenic castle, and several religious edifices. Saffron of good quality, and in considerable quantity, is grown in the vicinity. San F. stands on the site of the ancient Sikelian city of Agyrium, birthplace of Diodorus Siculus, and which, about B.C. 400, is said to have had 20,000 citizens. Pop. 12,000.

FILITELÆ, n. *fĭl-ĭ-tē'lē* [L. *filum*, a thread; *tela*, a web]: tribe of spiders noted for the construction of their web.

FILL, v. *fĭl* [AS. *fyllan*, to replenish: Icel. *fylla;* Ger. *füllen*, to fill: Lith. *pillu*, to pour into]: to put or pour in all that can be held; to crowd; to stuff; to content or satisfy; to hold or occupy, as any post or office; to supply the holder of the office; to engage or employ as time; to become full; N. as much as satisfies fully. FILL'ING, imp.: ADJ. causing fulness or satiety: N. act of making full; act of growing full. FILLED, pp. *fĭld*. FILL'ER, n. one who, or that which. To FILL FULL, to fill completely; to surfeit. To FILL UP, to fill to the brim or entirely; to complete; to grow or become quite full; to occupy the whole space. To FILL OUT, to enlarge.

FILLAGREE: see FILIGREE.

FILLAN, *fĭl'lan*, SAINT, or SAINT FAOLAN (surnamed the Leper): a Scoto-Irish ecclesiastic, whose yearly festival is on June 20. His chief church in Scotland was at the e. end of Loch Erne, in Perthshire, where 'St. Fillan's Well' was long believed to have supernatural powers of healing. A seat in the rock of Dunfillan still keeps the name of 'St. Fillan's Chair;' and two cavities beside it are said to have been hollowed by St. Fillan's knees in prayer. His Irish church is Ballyheyland (anciently called Killhelan or Kill Faelain), in the barony of Cullenagh, in Queen's county.

FILLAN, SAINT, the Abbot: Scoto-Irish saint of the 8th c.; son of St. Kentigerna of Inchcaileach, in Loch Lomond. His yearly festival is on Jan. 7 or 9. He joined the monastery of St. Mund on the Holy Loch, and after that saint's death succeeded him as abbot. His chief church in Scotland was in Perthshire, in the upper part of Glendochart, which takes from him the name of Strathfillan. Here, a well-endowed priory, dedicated in his honor, was repaired or rebuilt in the beginning of the 14th c. King Robert Bruce made a grant of money to the work, in gratitude, probably, for the miraculous encouragement which he was said to have received on the eve of Bannockburn from a relic of the saint—one of his arm-bones enclosed in a silver case. Another relic of St. Fillan —the silver head of his crosier, or pastoral staff—has been preserved to our time. It is called the 'Coygerach' or 'Quigrich,' and appears in record as early as 1428, when

it was in the hereditary keeping of a family named Jore or Dewar, believed to have been its keepers from the time of King Robert Bruce. They had half a bowl of meal yearly from every parishioner of Glendochart who held a merk land, and smaller quantities from smaller tenants; and they were bound, in return, to follow the stolen cattle of the parishioners wherever their traces could be found within the realm of Scotland. The Quigrich, besides its virtues in the detection of theft, was venerated also for its miraculous powers of healing. In 1487, the right of keeping it was confirmed to Malice Doire or Dewar by King James III. in a charter which was presented for registration among the public records of Scotland so lately as 1734. Sixty years later, the Quigrich still commanded reverence, but its healing virtues were tried only on cattle, and its once opulent keepers had fallen to the rank of farm laborers. It was publicly exhibited in Edinburgh 1818, before being carried to Canada by its hereditary keeper, Archibald Dewar. His son, Alexander Dewar, desirous that it should be restored to Scotland, came to an arrangement whereby, partly by purchase and partly by gift, it became the property of the Soc. of Antiquaries of Scotland. It was described by Dr. Daniel Wilson in a paper in the *Canadian Journal*, No. XXIV., reprinted as *The Quigrich, or Crosier of St. Fillan* (Toronto, 1859); see also *Historical Notices of St. Fillan's Crosier* by Dr. Stuart, reprinted from the *Proceedings of the Society of Antiquaries of Scotland*, vol. xii. (1877). A linn in the river Fillan or Dochart, in Strathfilan was long believed to work wonderful cures on insane persons, who were immersed in the stream at sunset, and left bound hand and foot till sunrise in the ruins of the neighboring church of St. Fillan.

FILLET, n. *fĭl′lĕt* [F. *filet*, dim. of *fil*, a thread—from L. *fīlŭm*, a thread]: a little band, such as may be put round the head; in *arch.*, a small space or band like a narrow ribbon, used with moldings; a narrow ornament or molding; in *her.*, an ordinary which, according to Guillim, contains the fourth part of the chief; in *dairy*, perforated curb to confine the curds in making cheese; in *die-sinking*, ribbon of metal of gauged proportions fed to the machine which punches out the planchets for coining; in *gilding*, band of gold-leaf on a picture frame or elsewhere; in *mach.*, the thread of a screw; in *manége*, the loins of a horse, beginning at the place where the back part of the saddle rests: V. to bind with a little band; in *arch.*, to adorn with a band or astragal. FIL′LETING, imp. FIL′-LETED, pp. FILLET, n. [F. *filet*, the band of flesh which lies along under the backbone of an animal]: a boneless lump of flesh bound together by a fillet or bandage; the fleshy part of the thigh in veal.

FILLIBEG, or PHILIBEG, n. *fĭl′ĭ-bĕg* [Gael. *filleadh*, plait or fold; *beg*, little]: the kilt of the Highlanders of Scotland, reaching nearly to the knees. *Note.*—The *sporran* is the pouch in front of the kilt.

FIL'LIBUSTERS: see FILIBUSTER.

FILLIP, n. *fĭl'lĭp* [an imitation of the sound: from FLIP]: a stroke with the finger-nail suddenly let go from the thumb: V. to strike smartly with the finger suddenly thrown outward from its bent position inward to the thumb. FIL'LIPING, imp. FIL'LIPED, pp. *-lĭpt.*

FILLIPEEN: see PHILOPENA.

FILLISTER, n. *fĭl'ĭs-tėr:* in *carp.*, rabbet on the outer edge of a sash-bar, to hold the glass and the putty; plane for making a rabbet.

FILLMORE, *fĭl'mōr*, MILLARD: President of the United States; 1800, Jan. 7—1874, Mar. 8 (pres. 1850, July 9—1853, Mar. 4); b. at Summer Hill, N. Y. Born of English parents, in rather straitened circumstances, all his education was in the village school. At the age of 15 he was sent to Livingston co. to learn the drapery trade, and soon afterward was bound apprentice to a wool-carder in his native village. During four years at this occupation, he used every means at his disposal to cultivate his mind, devoting his evenings to reading and study. In his 19th year he made the acquaintance of a lawyer named Wood, who discovering in the young man talents worthy of a loftier sphere, took an interest in him, and offered him a situation in his office, at the same time supplying him with funds for the prosecution of his studies for the legal profession. Fillmore entered with ardor on the course marked out for him, and in order that he might not be too great a burden upon his friend, applied a part of his time to teaching school. He removed to Buffalo 1821 to complete his studies, and 1823 was admitted a member of the bar. He gradually acquired reputation, and in 1829, he began his political career, being in that year chosen a representative of Erie co. in the legislature of N. Y., where he entered the ranks of the whig party, at that time in opposition. Here his probity and modesty soon gained universal esteem. He was mainly instrumental in procuring in N. Y. the abolition of imprisonment for debt. In 1832, Fillmore was elected a member of congress; and he was several times re-elected; but in 1844 he resumed his profession. In 1847, however, he returned to public life, being elected by a large majority to the post of comptroller of N. Y. and in the following year he was the whig candidate for vice-president of the United States, on the ticket with Gen. Zachary Taylor for president. The whigs were successful, and Fillmore entered on his office 1849, Mar. 5. By the unexpected death of General Taylor, 1850, July 9, Fillmore became president. His presidency was creditable in its aims, and in many of its measures, notwithstanding that his party were in the minority in congress, and that the shadow of the coming war was even then beginning to darken the land and confuse legislation with bitter partisanship and continuous attempts at an impossible compromise. Fillmore pro-

moted as far as he could the progress of exploration and discovery, at home and abroad. In 1855, he visited Europe, and on his return, 1856, he was again nominated for the presidency, but failed of election. Fillmore took no active part in the civil war; though nominally he sided with the Union. After the close of his presidential term, he returned to Buffalo, where he died.

FILLY, n. *fĭl′lĭ* [prov. Dan. *fyllie;* Icel. *fylja*, a filly—from *foli*, a foal]: a young mare, as opposed to a colt or young horse: a wanton girl.

FILM, n. *fĭlm* [AS. *film*, a skin: Fris. *fimel*, the skin of the body: W. *pilen*, rind]: a thin skin: V. to cover with a thin skin. FIL′MING, imp. FILMED, pp. *fĭlmd.* FILMY, a. *fĭl′mĭ*, composed of thin skins or membranes. FIL′MINESS, n.

FILM, a substitute for glass plates in photography. It consists of a thin strip of colorless, transparent celluloid, coated on one side with the sensitized collodion substance used for dry-plates. This is wound on a roller and placed in the camera in such a manner that as it is unwound from one roller it is wound on another, allowing one part after another to be exposed. The film is usually protected by a backing of black paper marked at intervals with white figures, which are read through a red celluloid target in the back of the camera, showing the correct length to be unwound for an exposure. The film has a great advantage over the plate in lightness and small bulk, and by the introduction of film-developing machines the processes of developing and fixing are much simpler and more convenient than in the case of plates.

FILOSE, a.: see FILAMENT.

FILOSELLE, n. *fī′lō-zĕl′* [F.]: a kind of floss silk.

FILTER, n. *fĭl′tĕr* [F. *filtrer;* Ger. *filtriren*, to filter—from mid. L. *filtrum*, a bit of felt, through which to strain liquids: It. *feltro*, a felt, a filter]: hence any open porous substance, as cloth, paper, sand, or gravel, through which a liquid may drain; a strainer: V. to purify; to pass through a filter. FILTERING, imp.: N. act of passing through a filter. FILTERED, pp. *-terd*, strained. FILTRATE, v. *-trat*, to strain; to filter. FILTRATION, n. *-trashun* [F.—L]: the act or process of filtering.

FILTH, n. *fĭlth* [AS. *filth*, filth: Icel. *fyla*, to stink, to putrefy (see FOUL)]: dirt; defilement; foul matter; anything which pollutes the mind. FILTHY, a. *fĭl′thĭ*, foul; dirty; unclean; morally impure. FIL′THILY, ad. *-lĭ*, foully; grossly. FIL′THINESS, n. nastiness; corruption; impurity. —SYN. of 'filthy': foul; impure; polluted; nasty; muddy; miry; sloughy; squalid; gross; sluttish; vulgar; licentious.

FILTRATION: the substance or apparatus through which liquid is strained:—the process of such straining. Solid matter suspended in a liquid in which it is insoluble may be separated by various means. For various methods

MILLARD FILLMORE.
Thirteenth President of the United States.

of causing such suspended matter to collect together and sink to the bottom or float on the surface, and thereby clearing the liquid. see FINING. Filtration consists in passing the liquid, through some porous substance, as paper, cloth, or sand, the interstices of which are too small to admit the passage of the solid particles which it is desired to separate from a liquid or gas. The principle of the action is the same as that of a sieve; but as the particles of fluids are immeasurably small, the pores must be extremely minute.

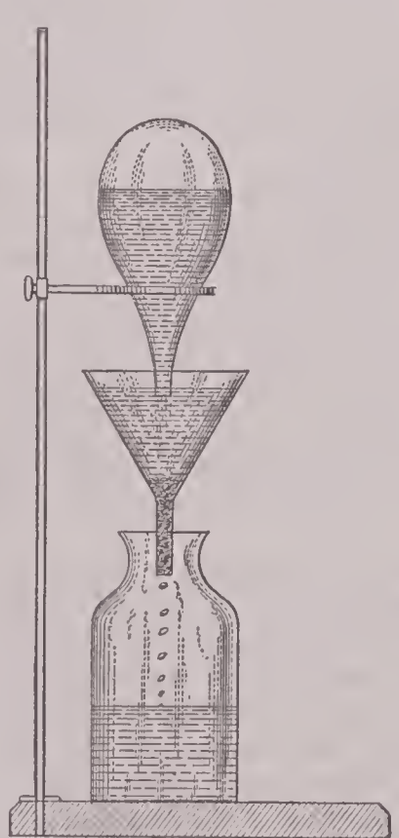
Examined under a microscope a piece of filtering paper is seen to be made up of fine threads interlaced so as to give the appearance of a network of interwoven sticks with variously sized interstices between. These interstices may be larger than the particles it is desired to separate; when such is the case the gradual coalescence of the particles in the liquid will cause them to gather upon these interwoven threads which serve as a support until a filter bed is formed sufficiently fine to hold back the particles it is desired to separate. Should the particles be in the form of a gelatinous mass, they would form a layer so dense that the filtration through them of a liquid would be practically impossible. This is a difficulty sometimes met with in the manufacture of beer or the disposal of sewage. In such cases other methods of treatment must be found. Occasionally the particles will not thus adhere to the threads of the filter, and various methods, as boiling, etc., must be resorted to, a refinement of the process confined practically to laboratories and technological establishments.

The simplest form of filter is that commonly used in chemical laboratories for separating precipitates, etc. A square or circular piece of unglazed paper, specially prepared, is folded in four, the corner where the four folds meet is placed downwards in a funnel, and one side is partly opened so that the paper forms a lining to the funnel. The liquid passes through the pores of the paper and the solid matter rests upon it. This laboratory filter is generally used because of its simplicity, and the ease with which the solid matter may be separated and examined.

A simple water filter for domestic purposes is made by stuffing a piece of sponge in the bottom of a funnel or the hole of a flowerpot, and placing above it a layer of smooth pebbles, then a layer of coarse sand, and above this a layer of pounded charcoal three or four inches in depth. Another layer of pebbles should be placed above the charcoal to prevent disturbance when water is poured in. Such a filter will require occasional cleaning, as the suspended impurities are left behind on the charcoal, etc. This is best done by renewing the charcoal, rinsing the gravel and sand, and taking out the sponge and washing it. By a small addition to this a cottage filter may be made, which, for practical use, is quite equal to the most expensive filters of corresponding size. It consists of

two flowerpots, one above the other; the lower one is fitted with the sponge and filtering layers above described and the upper one with a sponge only. The upper pot should be the larger, and if the lower one is strong the upper one may stand in it, or a piece of wood with a hole to receive the upper pot may rest upon the rim of the lower. The two pots thus arranged are placed upon a stool with a hole in it, through which the projecting part of the lower sponge passes, and the water drops into a jug placed below. The upper pot serves as a reservoir, and its sponge stops the coarser impurities. The filtering layers of the lower pot may be used for two or three years without being renewed, if the upper sponge be occasionally cleaned. Care must be taken to wedge the upper sponge tightly enough to prevent the water passing from the upper pot more rapidly than it can filter through the lower one. A great variety of filters is constructed of ornamental earthenware or porcelain vessels of suitable shape. The buyer of a filter must not be satisfied with seeing merely that the water which has passed through is rendered transparent—this is easily done by almost any new and clean filter—he should see that the filter admits of being readily cleansed.

When a considerable quantity of liquid has to pass through a filter, it is sometimes desirable that it should be made to feed itself. In the laboratory this is done by inverting a flask filled with the liquid over the filtering funnel, the mouth of the flask just touching the surface of the liquid when at the desired height in the funnel. As soon as it sinks below this, air enters the flask and some liquid enters the funnel. (See illustration.) On a large scale, self-acting filters are fed by the common contrivance of a ball-cock and supply-pipe. In case considerable filtration is to be done the natural process is too slow, and various methods of acceleration are resorted to. All involve pressure and may be considered under filter presses, filter pumps, centrifugal machines and other methods.



Filter presses have been in use for more than 100 years. The construction of the press, which has been reduced to the simplest possible form, consists essentially of a series of compartments lined with a filtering material,

preferably cloth, which strains the filtrate from the precipitate of the mixture pumped in under pressure. At the end of the process, or as often as necessary, the compartments are opened and the separated and hardened precipitate is removed, and the press closed up again ready to repeat the filtering process. For details of construction and use, see works on Technology.

Filter pumps are a much more recent invention. They are ordinary air-pumps adjusted to produce a vacuum or a chamber of rarefied air beneath a filter. The aim is to make them as automatic as possible, removing the air as the filtrate falls from the lower surface of the filter. The first pumps, of the statical or Geissler type, invented in 1855, were an application of the vacuum principle worked out of the idea of Torricelli. These have been greatly improved in recent years. Some years later a dynamic pump was devised by Springel, in which the continuous falling of water or other liquid produces a vacuum. The Springel type of filter pump has a significant place in the development of modern chemistry. Injection or pressure pumps are doubtless the most generally used in laboratories and technological establishments. They consist of a tube of any convenient form, furnished with a constricted jet in front of an expanding mouthpiece. They can be worked by water, steam, electric current, or other force. A long list of these pumps might be given.

The centrifugal machines adapted for filtering processes, whether under-driven or over-driven in their construction, are pressure machines adjusted for tangential delivery of the filtrate. The principle involved is applicable on a commercial scale and has accordingly wide use in the arts, e.g., the Solvay process of preparing sodium ammoniate, the separation of sugar crystals from syrup, the treatment of heavy precipitates on a large scale, etc.

Filtration is a process which has received much attention in recent years. Extensive experiments have been made, among many others, to ascertain whether soluble matter, such as common salt, is in any degree removed from water by filtration. Theoretically, it has been assumed that this is impossible, since the filter acts only mechanically in stopping suspended particles; but the results of Mr. H. M. Witt's experiments show that 5 to 15 per cent. of the soluble salts were separated by sand filters. Another important matter is ascertaining to what extent soluble organic matter may be decomposed by filtration, especially by charcoal filters, and how long charcoal and other porous matter retains its property of acting on organic matter in watery solution. The power of dry charcoal in decomposing organic matter is well established and it is also well known that fresh charcoal acts powerfully upon organic matter in solution, but the extent to which this power is retained in the charcoal of a filter in continuous action has not been ascertained. This is of the highest importance, as it sometimes happens that water of

brilliant transparency, and most pleasant to drink, on account of the carbonic acid it contains, is charged with such an amount of poisonous organic matter as to render its use as a daily beverage very dangerous. Charcoal obtained from burning bones is more efficacious than charcoal from wood. A filter of animal charcoal renders London porter colorless. Loam and clay have similar properties. Putrid urine and sewer water, when passed through clay drop from the filter colorless and inoffensive.

When a liquid contains mucilaginous or other matter having viscous properties, there is considerable difficulty in filtering it, as the pores of the medium become filled and made water-tight. Special filters are therefore required for syrups, oils, etc. Such liquids as ale, beer, etc., are difficult to filter; therefore they are clarified by the processes described under FINING. Oil can be passed through long bags made of twilled cotton cloth (Canton flannel) 4 to 8 feet long, and 12 to 15 inches in diameter, inclosed in coarse canvas bags 8 to 10 inches in diameter. Thus the inner filtering-bag is corrugated or creased, and a large surface in proportion to its size is presented. Syrups are filtered on a small scale by confectioners, etc., by passing them through conical flannel bags, and on a large scale in the creased bag-filter above described. Thick syrups have to be diluted or clarified with white of egg to collect the sediment into masses, when they may be filtered through a coarse cloth strainer. Vegetable juices generally require to be treated in this manner.

Simple laboratory filters are modified when strong acid or alkaline solutions, or substances which are decomposed by organic matter, require filtration. Pure silicious sand, a plug of asbestos, pounded glass, or clean charcoal, are used. Gun-cotton is recommended as a filter for such purposes where concentrated nitric acid, fuming sulphuric acid, chromic acid, permanganate of potash and concentrated solutions of potash and aqua regia are treated. Gun-cotton is attacked at ordinary temperature only by acetic ether.

Filter paper for the laboratory requires to be freed from inorganic impurities soluble in acids. This is effected by washing the paper with hydrochloric acid, or, when thick, with nitric and hydrochloric acid.

Air Filters.—The extraordinary power of charcoal in disinfecting the gaseous products evolved from decomposing animal and vegetable matter has been made available in an apparatus for purifying air. A suitable cage, containing charcoal in small fragments, fitted to the opening from which deleterious gases issue, renders them perfectly inodorous, and probably inocuous. The first application was made 1854, when a charcoal air-filter was fitted up in the justice-room of the Mansion House, London, the window of which opens above a large urinal, the smell of which was very offensive in the room. The filter at once destroyed the nuisance, and the charcoal lasts many

years without the need of renewal. Such filters have been applied to the outlets of the sewers of one district of the city of London, and no bad smell is observable where they are placed, and no obstruction offered to the ventilation of the sewers. Charcoal respirators are small air-filters of the same kind applied to the mouth. See RESPIRATOR.

For further discussion, see articles relating to WATER PURIFICATION; WATER SUPPLY; SEWAGE DISPOSAL.

FILUM AQUÆ, *fī'lŭm ā'kwē* [Lat., thread of water]. legal expression, meaning the boundary line determined by a stream of water flowing between the land of two separate owners. Where an unnavigable stream or where a navigable stream above the point where the tide ebbs and flows is cited as the boundary between the separate portions of land lying opposite to each other on its shores, each owner is held to possess the land to the centre or axis of the stream. This imaginary line is called in legal parlance *filum aquæ*. This ownership applies only to the land beneath the water; no right of disturbing the stream beyond the extent involved in ordinary use of the water is implied. If an island forms in the middle of the stream each riparian owner has a right to one-half thereof. In some of the states the courts hold that the *filum aquæ* only exists in unnavigable streams, and that the state owns the beds of all navigable rivers, even though they are unaffected by the tide.

FIMBRIATE, a. *fĭm'brĭ-āt*, or FIM'BRIATED, a. [L. *fimbrĭæ*, threads, fringe]: fringed at the margin; bordered; in *her.*, said of an ordinary having a narrow border or edging of another tincture. FIM'BRIÆ, n. plu. *-brĭ-ē*, in *anat.*, a structure resembling a fringe. FIMBRILLIF'EROUS, a. *-brĭl-lĭf'ėr-ŭs*, in *bot.*, bearing numerous little fringes, as the receptacle of some composites.

FIN, n. *fĭn* [AS. *finna;* Dan. *finne;* L. *pinna*, a fin—see letter F]: the membrane or limb of a fish for support and locomotion (see FINS). FINNER, or FINBACK, any whale which has an adipose fin on its back. The genera *Megaptera*, *Balænoptera*, and *Physalus* have this character. They all belong to the family *Balænidæ*. FINNED, a. *fĭnd*, having fins. FINNY, a. *fĭn'nĭ*, furnished with fins. FIN'LESS, a. without fins. FIN-FISH, sailor's name for some of the fin-backed whales, especially for the Northern Rorqual, or Razor-backed Whale. FIN-FOOT, in *zool.*, *Heliornis*, genus of S. American and Burmese birds belonging to the family *Rallidæ* or rails. FIN-PIKE, the *Polypteri*, subfamily of ganoid fishes. FIN-SCALE, a name given to the rudd or red-eye. FIN-RAY, the rigid part of the fin in fishes. FIN-FOOTED, web-footed; having membranes between the toes.

FINABLE: see under FINE 1.

FINAL, a. *fī'năl* [F. *final*—from L. *finālĭs*—from *fīnĭs*, an end]: last; conclusive; pertaining to the end. FI'NALLY,

ad. *-lĭ.* FINALITY, n. *fī-năl'ĭ-tĭ,* the state of being final; completeness. FINALE, n. *fĭ-nâ'lā* [It.]: close; termination; that part of a musical composition which finishes the act of an opera; also the last movement of an instrumental composition, as in the symphony, quartet, quintet, sonata, etc. The finale, in purely instrumental works, is always lively: in the opera, it depends on the subject, in some operas the finale consists of an aria alone, as in Mozart's *Figaro,* instead of the usual full concerted music for soli and chorus.—SYN. of 'final': ultimate; latest; decisive; terminating.

FINAL CAUSE. See CAUSE and ARISTOTLE.

FINALE, *fē'nâ'lā:* town of n. Italy, province of Modena, on the Panaro, 22 m. n.e. from Modena. It is surrounded by walls, has manufactures of linen and silk, and an active general trade. Pop. 4,500.

FI'NAL JUDG'MENT. The meaning of this term in the law of Scotland having led to some dispute, an Act of Sederunt (q.v.) was passed on the 11th July, 1828, declaring it to be applicable to a case in which 'the whole merits of the cause have been disposed of, although no decision has been given as to expenses, or, if expenses have been found due, although they have not been modified or decerned for.' The importance of the definition arises from the fact that only final judgments can be carried by advocation from the inferior to the superior courts. 'The whole merits of the cause' has been held to mean, not only, the merits of the action to which the advocator is a party, but also those of any other conjoined with it. If the parties in the conjoined action will not proceed to have it determined, the advocator ought to apply to the inferior judge, stating his intention to advocate, and praying him to call on the parties to proceed with the conjoined process; and, failing their doing so, to disjoin the causes, which disjunction will render an advocation competent. Shand's *Practice,* i. p. 454. In Advocations (q.v.) and Suspensions (q.v.), if the record be closed, and the proof concluded in the inferior court, the case may be taken at once to the Inner House without a judgment of the Lord Ordinary, 13 and 14 Vict. c. 36. In order to warrant an appeal to the circuit court in a civil cause (where otherwise competent) not only the merits must have been disposed of, but the expenses modified and decerned for.

FINANCE, n. *fī-năns'* [OF. *finance,* wealth, an exaction, a compulsory payment—from mid. L. *financĭă,* a payment—from *finārĕ,* to pay a fine or tax—from mid. L. *finis,* the termination of a suit in law, the money paid as the price of settlement—from L. *finis,* the end: OF. *finer,* to pay an exaction or composition]: revenue; income: V. among *commercial men,* to raise money or funds, usually for a special or speculative object. FINAN'CING, imp. FINANCED, pp. *fī-nanst'.* FINANCES, n. plu. *fī-năn'sĕz,* income or resources; funds in the public treasury. FINANCIAL, a. *fī-năn'shăl,* pertaining to public revenue or income. FINAN'-

CIALLY, ad. *-lĭ.* FINANCIER, n. *fĭ-năn'sēr,* one skilled in the principles of banking, or in the management and raising of the public revenue.

FINANCE: science or art of managing money matters. Finance in the plural, finances, is often used for money itself, but still with a reference to the purpose to which it is to be applied, as where the finances of a country are said to have improved or fallen off—that is to say, have become abundant or scanty according to the expenditure of the country. Sometimes the word is applied to private wealth, but it is properly applicable to public funds. In Britain and the United States, it is used rather in a political and economic sense than officially, but in France there have been, from time to time, comptrollers-gen. of finance, councils of finance, bureaus of finance, etc. Many statesmen have been spoken of as great financiers, from the talent which they have shown for adjusting national revenue and expenditure, as Colbert, Turgot, and Necker in France, Goldolphin and Peel in Britain, and Hamilton, Fessenden, and Sherman in the United States. As a branch of statesmanship, finance is intimately connected with other branches. In questions of national policy—such as, whether a state can go to war or not—the financier is the person who is expected to count the cost, and say how the necessary funds are to be obtained. In the question, whether an unpopular or oppressive tax is to be abolished, or a desirable tax to be imposed, the financier is an authority on the question, whether the government can do without it, or how, if needful, it shall be imposed. Hence, there is a special connection between finance and taxation, which has become closer and stronger since the progress of political economy has shown that the taxes which are the most productive, and even the most easily collected, are not always the best, looking at the gain or loss of a nation, in the long-run. Turgot said that finance was the art of plucking the fowl without making it cry. On this principle indirect taxation, e.g., as involved in customs duties, has achieved its popularity, since such duties often bring no tangible hardships on any one. Yet, indirect taxes, because of their very indirectness, need careful watching and skilful adjustment to the needs of each case. See further, CUSTOMS; DEBT, NATIONAL; CORN LAWS; EXCISE; FREE TRADE; TAXATION; TARIFF; REVENUE; also, BANK, CURRENCY; MONEY; EXCHANGES; COINAGE; CLEARING HOUSES; CURB MARKET; COMMODITY EXCHANGES; FOREIGN EXCHANGES; LEGAL TENDER; etc.

FINBACK: see RORQUAL.

FINCH, n. *fĭnsh* [AS. *finc;* Dut. *vink;* Ger. *fink;* W. *pinc,* a chaffinch (see CHAFFINCH)]: popular name of a great number of species of little birds of the order *Insessores,* tribe *Conirostres.* Many have great powers of song, and are called *Hard-billed Song-birds,* in contradistinction to the Warblers (*Sylviadæ*) or *Soft-billed Song-birds.* The name finch is sometimes used as equivalent to *Fringillidæ* (q.v.), either in its more extensive or more restricted

application; but the limits of its popular use are very indeterminate, and some birds are equally known as finches and linnets, or as grosbeaks, etc. The word finch often forms part of the popular name of birds of this family, as bullfinch, chaffinch, hawfinch, pine-finch, etc.

FINCK, Henry Theophilus, American musical critic: b. Bethel, Mo., 1854, Sept. 22. He was graduated at Harvard in 1876; and from 1878 to 1881 studied physiological psychology at Berlin, Heidelberg, and Vienna. He is musical critic of the New York Evening *Post*. His works include: *Wagner and His Works; Romantic Love and Personal Beauty* (1887); *The Pacific Coast Scenic Tour* (1890); *Chopin and Other Musical Essays; Lotos Time in Japan* (1895); *Spain and Morocco; Paderewski; Primitive Love* (1899); *Songs and Song Writers* (1900); *Fifty Master Songs* (1902); *Fifty Schubert Songs* (1903); etc.

FIND, v. *fīnd* [Icel. *finna;* Ger. *finden*, to find]: to discover; to recover; to regain something lost; to gain or have to furnish or supply; to arrive at; to perceive; to determine, as by a verdict: N. discovery; thing found. Find'ing, imp. N. that which is found by the jury; a verdict. Found, pt. and pp. *fownd*, did find. Find'er, n. one who. Finding-shop, shop where shoemaker's supplies are sold. To find in one's heart, to be bold enough or hard-hearted enough to do a thing. To find out, to discover; to detect. To find fault, to censure.

FINDER OF GOODS: one who discovers articles lost by another. The finder acquires a special property in goods which is available to him against all the world except the true owner; but before appropriating them to his own use, he must use every reasonable means to discover the owner. It has been decided that if the property had not been designedly abandoned, and the finder knew who the owner was, or knew that he could have discovered him, he was guilty of larceny in keeping and appropriating the articles to his own use. In a case in England, in which a person purchased, at public auction, a bureau, in which he afterward discovered, in a secret drawer, a purse containing money, which he appropriated to his own use, Mr. Baron Parke thus laid down the law: 'The old rule, that "if one lose his goods, and another find them, though he convert them *animo furandi* to his own use, it is no larceny," has undergone in more recent times some limitations. One is, that if the finder knows who the owner of the lost chattel is, or if, from any mark upon it, or the circumstances under which it was found, the owner could be reasonably ascertained, then the fraudulent conversion, *animo furandi*, constitutes a larceny.' This law, however, though in most cases clear, is, in some, extremely difficult in application, and judges and juries often go wrong. The question for the jury is not whether they think that the finder could have discovered the owner, but whether he believed that he could; and, if not satisfied as to this, they cannot convict him of larceny.

It is a mistake to suppose that the finder is bound in law—though he may well be in honor—to advertise, or use extraordinary means to discover the owner; indeed he cannot claim such expenses from the real owner, if he appear.

FINDHORN, *fĭnd'horn:* river rising on the w. side of the Monadh Liadh Mountains, in the e. of Inverness-shire, Scotland. It runs n.e. through the counties of Inverness, Nairn, and Elgin, in the valley of Strathdearn, passes Forres, and enters the Moray Firth at the village of Findhorn by a lagoon three m. by one and a half m. in extent, after a course of about 90 m. Its waters abound in salmon and trout. Its basin consists of gneiss in the upper part, and of old red sandstone in the lower. At one place it rose nearly 50 ft. in the great floods of 1829, Aug., known as the 'Moray Floods,' and did much damage. W. of the mouth of the Findhorn are the Culbin Sands, in one part 118 ft. high, and covering 9,500 acres of a formerly fertile tract.

FINDLAY, *fĭnd'lā:* city, cap. Hancock co., O.; on Blanchard's Fork of the Auglaize river; on the Lake Erie and Louisville, and the F. Branch railroads; 31 m.e.n.e. of Lima, 37 m. s.w. of Fremont. Findlay is the centre of the natural gas region, contains many fine churches, national and private banks, weekly newspapers, and has extensive glass-works, rolling-mills, nail-factories, machine shops, foundries, flour, oil, and flax mills, and woolen, carriage, spoke, and stave factories. The discovery of natural gas and the opening of gas-wells have given an immense impetus to manufacturing and a sudden growth in population. Pop. (1910) 14,858.

FINE, n. *fīn* [mid. law L. *finis*, applied to the money paid as the price of settlement (see FINANCE)]: a sum of money paid as a penalty, as a punishment, or as the price of exemption: V. to impose a penalty on; in *OE.*, to pay a fine. FI'NING, imp. FINED, pp. *fīnd*, subjected to the payment of a sum of money as a penalty or for a privilege. FINABLE, a. *fī'na-bl*, subject to a fine or penalty.—SYN. of 'fine, n.': mulct; penalty; forfeit; amercement.

FINE, n. *fīn* [Ger. *fein;* It. *fino;* F. *fin*, slender, clear—from mid. L. *finītus*, finished, perfected—hence, refined, keen: W. *gwyn*, white, fair: Icel. *fina*, to polish, to cleanse: comp. Gael. *fionn*, white, pure]: not coarse; very thin; of small diameter; slender; clear; elegant; beautiful; very handsome; in *OE.*, artful; fraudulent; sly; over-sly cunning, or nice, as 'my fine fellow': V. to clarify; to free from foreign matter; in *OE.*, to decorate; to embellish. FI'NING, imp. refining, purifying: N. the process of refining or purifying (see below). FINED, pp. *fīnd.* FINE'LY, ad. *-lĭ*, in a fine manner; beautifully; not coarsely. FINE'NESS, n. thinness; clearness; delicacy; purity. FI'NER, n. one who purifies metals. FI'NERY, n. *-nėr-ĭ*, show; splendor; showy dress or ornaments; a furnace at ironworks for purifying iron. FINE-DRAWING, art of sewing up rents with such skill that they are imperceptible; a finishing pro-

cess with cloth, in which it is subjected to a strong light, while all faulty parts or breaks in the fabric are closed by sound yarn introduced by a needle. FINING-FORGE, in *metal.*, open hearth with a blast, by which iron is freed from impurities or foreign matters. Cast-iron is thus rendered malleable. FINING-POT, a pot or crucible for refining metals. FINING-ROLLER, in *paper-making*, a cylindrical wire-cloth sieve in the paper-making machine, which allows the finely-ground stuff to pass, but retains the coarse fibres and knots. FINE-SPOKEN, using fine phrases. FINE-SPUN, minute; ingeniously contrived; artfully invented. FINE ARTS: see under ART.—FINE-DRAWN, over minute or nice. *Note.*—Two lines of derivation of FINE are given, showing the usual amount of confusion and adaptations.—SYN. of 'fine, a.': finished; refined; excellent; superior; showy; subtile; thin; subtle; nice; delicate; exquisite; artful; sly; comminuted; filmy; attenuate; keen; light; delicate; minute; pure.

FINE, *fīn* [L. *fīnis*, an end]: used only in the adverbial phrase IN FINE, to conclude; to sum up all: V. in *OE.*, to end. FINE'LESS, a *fīn'lĕs*, in *OE.*, boundless; endless.

FINE OF LANDS, in England: fictitious proceedings formerly in common use to transfer or secure real property by a mode more efficacious than an ordinary conveyance. A F. (so named because it put a termination (*finis*) to all litigation between the parties and those claiming through them in regard to all matters touching the suit) was at first an amicable composition between parties; afterward this procedure was generally adopted for conveyance of land. It was abolished by the *Fines and Recoveries Act*, 3 and 4 W. IV. c. 74. See CONVEYANCES: USES: FEME COVERTE.

FINERY: see FINE 2.

FINESSE, n. *fĭ-nĕs'* [F.—from *fin*, fine, slender—from *fīnītus*, finished, perfect]: artifice; stratagem. FINES'SING, a. practicing artifice to accomplish a purpose: N. the practice of artifice.

FINGAL, *fĭng'gal:* hero in a collection of poems purporting to have been written by Ossian, son of F., and translated from the ancient Gaelic language by James Macpherson (1762); also title of a separate poem in six books. Macpherson's first work was *Fragments of Ancient Poetry collected in the Highlands of Scotland, and Translated from the Gaelic or Erse Language* (1760). This had such success among scholars that he was urged to continue his literary researches, and published *Fingal, an Ancient Poem in Six Books, together with Several other Poems composed by Ossian, Son of Fingal*, etc. (1762), and *Temora, an Ancient Epic Poem, in Eight Books* (1763). For some time the various poems produced a literary sensation; at length critics began calling on Macpherson for the original Gaelic of Ossian. He declined the requests, and a controversy was opened that lasted 50 years, during which Dr. Johnson gave his opinion that the poems had never

existed in any other form 'than that which we have seen.' Subsequently the Highland Soc. of London declared that 'no poems of the kind can be found to exist in the memories of the Highlanders.' The reproduction of the Highland spirit and style is remarkable, giving a certain interest and value to this strange work.

FIN'GAL'S CAVE: see STAFFA.

FINGER, n. *fĭng'gėr* [Goth. *figgrs;* But. *vinger;* Icel. *fingr;* Ger. *finger;* Fris. *fenger*, a finger: Ger *fangen*, to seize, to catch]: one of the five divisions of the hand; a measure (see HAND). FINGERER, one who fingers; a pilferer; a purloiner; a thief: V. to touch lightly; to handle with the fingers. FIN'GERING, imp. handling; touching lightly: N. act of touching lightly or handling; manner of touching a musical instrument. FIN'GERED, pp. *-gėrd*, played on; handled; touched: ADJ. having fingers. FINGER-POST, a post with a painted hand for direction passengers to a road FINGER-BOARD, that part of a stringed musical instrument, as in the violin, violoncello or guitar, which is made of ebony-wood, and glued on the neck of the instrument, and shaped on the top to suit the position in which the strings lie on the nut and the bridge. At the lower end, the finger-board projects over the sounding-board of all those instruments played with the bow, while in the guitar species the finger-board is glued down on both neck and sounding-board The strings are pressed down by the fingers of the left hand, to make the different notes in music; while the right hand produces the sound either by a bow or the points of the fingers. FINGER-FERN, *Asplenium ceterach.* FINGER-FLOWER, *digitalis purpurea.* FINGER-GLASS, glass or bowl in which to rinse the fingers after dinner or dessert. FINGER-GRASS, *Digitaria*, genus of grasses. FINGER-GRIP, tool for recovering rods or tools dropped into a bored shaft. TO HAVE AT ONE'S FINGER-ENDS, to be thoroughly familiar or off-hand with. FINGER-AND-TOE, a diseased form of turnip-growth, in which the bulbs are divided into two or more forks: see ANBURY.

FINIAL, n. *fĭn'ĭ-ăl* [L. *fīnĭs*, an end—from *finīrĕ*, to finish or complete]: ornament, generally carved to resemble foliage, which forms the termination of pinnacles, gables, spires, and other portions of Gothic architecture. There are traces of foliated terminations, both in stone and metal, on the pediments of classic buildings (see ACROTERION), but it was not till the 12th c. that the finial proper was introduced. During the latter part of that c. and the whole of the 13th c. finials of perfect form and of endless variety were used as the crowning ornaments of every salient point in the buildings of the period (see fig. 1). The architects of the 14th c., in finials, as in other ornaments, imitated more closely the forms of natural foliage; but their finials had neither the variety of design nor the vigor of outline of those of the preceding century (see fig. 2). In the 15th and 16th c., the finials became more and more meagre in form, and are frequently only four crockets set

upon a bare pyramidal terminal. Some variety of effect is often obtained during this period by surmounting the finial with a gilded vane. This is common in Tudor and domestic architecture (fig. 3). Finials were carved both in stone and in wood, and in the latter material with great delicacy and minuteness. In connection with metal-work, finials of metal were used, and whatever the material adopted, its natural capabilities were made a source of special beauty. —The finial is one of the most effective ornaments of Gothic architecture, and when that style was succeeded by the revival of classic, in the reign of Queen Elizabeth, our forefathers could not persuade themselves to part with the finials to their buildings. We thus find in Elizabethan architecture a great variety of finials; they are, however,

Finials:
1, from Bishop Bridport's Monument, Salisbury Cathedral; 2, York Minster; 3, Maulbroun, Germany; 4, Crew Hall, Cheshire; 5, Augsburg.

almost entirely of geometric form, and without foliage (fig. 4), and are frequently, especially when terminating wooden gables, combinations of finial and vane partly wood and partly iron (fig. 5). In the stricter classic which succeeded the Elizabethan, some traces of the favorite finial remain in the balls, obelisks, etc., used as terminations, and also in the shields and supporters (themselves a remnant of feudalism) which form the crowning ornament of gate-piers, pedestals, etc.

FINICAL, a. *fĭn′ĭ-kăl* [Dut. *fijnkens*, perfectly, neatly: comp. Gael. *fionag*, an animalcule, a mite (see FINE 2)]: affectedly nice or showy; affectedly precise in trifles; effeminate; foppish. FIN′ICALLY, ad. *-lĭ*. FIN′ICALNESS, n. FINIC, a. *fĭn′ĭk*, or FINICKING, a. *fĭn′ĭ-kĭng*, and FINIKIN, a. *fĭn′ĭ-kĭn*, affectedly nice; unduly particular; fastidious; fussy; finical.

FINING.

FIN'ING: process of clearing turbid liquors, such as beer, wine, etc. The simplest mode of fining is by passing the liquor through a porous substance that retains the solids and allows the clear liquid to pass (see FILTER); but this method is applicable only to particles mechanically suspended in a limpid liquid. When the liquid contains mucilaginous or other matter that readily clogs the filter, some other means of fining must be used; as with all malt liquors and most wines when turbid. When in good condition, these do not usually require fining as the suspended matter agglomerates, and sinks to the bottom shortly after the fermentation is completed. When this does not take place, some means of promoting such action are usually adopted. One of the simplest is to add soluble albumen, such as white of egg, to a portion of the liquid, and after beating it well in this, to add the mixture, and stir it into the whole of the liquid. Upon application of heat, the albumen coagulates and contracts from its diffusion into a scum, enveloping and drawing together the suspended matter. The scum is then easily removed. This method is adopted for syrups and other liquids that may be heated without mischief. In making clear soups, the albumen of the meat performs this function. As alcohol coagulates albumen, it may be used for fining wines and cordials without the application of heat. It is generally used for red wines. Malt liquors are usually fined by means of gelatine, either isinglass or cheaper substitutes being used. One pound of isinglass is soaked in three or four pints of water or sour beer, then more sour liquor added as the isinglass swells, until it amounts to about a gallon. The jelly thus formed is next dissolved in seven or eight gallons of the liquor to be fined. This solution, having the consistence of a syrup, is called 'brewers' finings,' and about a pint to a pint and a half is added to a barrel of ale or porter, or to a hogshead of cider or wine. The action of this depends upon the combination of the gelatine with the astringent matter (tannic acid) of the liquor, forming thereby an insoluble solid, which sinks to the bottom, and carries with it, like the coagulating albumen, the suspended matter; but as the flavor of malt liquors depends partly on the astringents that they contain the fining affects the flavor; the astringents also help to preserve the liquor; hence their removal is in this respect disadvantageous. Malt liquors thus fined do not 'stand well on draught'. The use of gelatine for fining red wines is objectionable, as in most of these the astringent flavor is an esteemed quality; therefore albumen is preferred.

Other methods of fining are adopted. Sugar of lead is sometimes added, and afterward one-half its weight of sulphate of potash dissolved in water. By this means, an insoluble sulphate of lead is precipitated, which in subsiding carries down other matters with it. This is a dangerous process, the salts of lead being poisonous. If properly conducted the whole of the lead may be precipitated, but

a casual mistake in the quantities might cause the death of many people. The method should never be resorted to. Ox-blood is used in the same manner as albumen and isinglass. Lime, alum, alcohol, and acids act by coagulating albumen etc., contained in the liquor. Plaster of Paris, clay, and even sand, are sometimes used to carry down the suspended matters. A strip of isinglass or a piece of dried sole-skin is often used for fining coffee, and it acts in the manner above described. Liquors unusually difficult to fine are called 'stubborn' by coopers and cellarmen.

FINIS, n. *fī′nĭs* [L.]: end; conclusion.

FINISH, v. *fĭn′ish* [F. *finissant*, finishing—from *finir.*, to finish—from L. *finīrĕ*, to put an end to—from *fīnĭs*, an end: It. *finire*]: to put an end to; to complete; to perfect; to come to an end: N. completion; the last touch to a work; that which gives perfection to a work of art; the last coat of plaster on a wall. FIN′ISHING, imp.: ADJ. completing; perfecting: N. completion; perfection; last polish. FIN′ISHED, pp. *-ĭsht:* ADJ. complete; perfect in the highest degree. FIN′ISHER, n. one who puts an end to or completes.—SYN. of 'finish, v.': to close; conclude; terminate; end; accomplish; polish.

FINISTERRE, *fĭn-ĭs-tār′*, or FINISTERE [Lat. *Finis terræ*, 'Land's End']: dept. at the w. extremity of France, comprehending a part of the former duchy of Bretagne (q.v.); 2,648 sq. m. It is traversed from e. to w. by two low but picturesque chains of hills. Its coast is very rugged and broken, its shores bristling with dangerous granite rocks, and fringed with many islands. The soil, one-third of which is occupied by sandy tracts and marshes, is moderately productive; and owing to the vicinity of the sea, which washes the n., w., and s. shores of the department, the climate is mild and humid. Corn, hemp, and flax are grown in considerable quantities. In the valleys are smiling meadows. The silver and lead mines of Finisterre are very valuable; those of Pouillaouen and Huelgoet being about the richest in France. Its principal rivers are the Aulne, the Elorn, and the Odet. The Aulne is connected by a canal with the Blavet, and forms part of the great line of communication by water from Brest to Nantes. This dept. is divided into five arrondissements: Quimper, Brest, Châteaulin, Morlaix, and Quimperlé. Quimper is the chief town. Pop. (1901) 773,014.

FIN′ISTERRE, CAPE, or LAND'S END: promontory at the n. w. extremity of Spain, lat. 42° 54′ n., and long. about 9° 20′ w.; the *Promontorium Nerium* of the ancients.

FINITE, a. *fī′nīt* [L. *finītus*, limited, bounded]: bounded; having limits. FI′NITELESS, a. unlimited. FI′NITELY, ad. *-lĭ.* FI′NITENESS, n. state of being limited; confinement within certain boundaries. *Note.*—INDEFINITE, without bounds. INFINITE, above relations to space.

FINLAND.

FINLAND, *fĭn'land* [Fin. *Suomesimaa*, land of lakes and marshes]: a grand duchy of Russia, between 59° and 70° n. lat., and 21° and 33° e. long., about 750 m. from n. to s., average breadth about 185 m. It is one of the general governments or provinces of Russia, and under the supreme authority of a gov.-gen., representing the emperor; area, 144,255 sq. m., of which nearly one-third is occupied by marshes and lakes. The largest of these sheets of water, independently of Lake Ladoga, which belongs partly to the Russian province of Olonetz, are Lakes Puruvesi, Payane, Enara, and Saima; the last of these, about 180 m. in length, constitutes a portion of the system of water-communication which has been established between the central parts of the country and the Gulf of Finland. The lakes are especially numerous in the s.w. of Finland where they are almost all united together by rivers and waterfalls, round the central lake of Pyhäjärvi. The surface is a table-land, 400 to 600 ft. above the sea, with occassional higher elevations. There are no mountain ranges; hence the rivers are unimportant; but in the n. the country is intersected by a sandy ridge known as the 'Maanselkae', which merges, under the name of the Lapintunturit Mountains, into the great Lappo-Norwegian Alpine chain. The coast-line is generally low, but to the s. is skirted by numerous rocky islands, separated from the land by narrow channels, difficult of navigation, but adapted for defense against hostile attacks from the sea. The principal geological formations are friable granitė, hard limestone, and slate. The forests of Finland are still very abundant, though they have been recklessly cut down in many parts of the country for the sake of their ashes, which are used to stimulate the soil, whose natural poverty requires to be counteracted by frequent manuring. Pine and fir predominate, but birch, beech, oak, etc., thrive in the s. of the country, where is also some good pasture-land. Since the incorporation of Finland with Russia, agriculture has declined, and fishing and cattle-breeding increased in importance. The annual exports from Finland have a value of about $25,000,000; the imports nearly reach $35,000,000. The most valuable are the products of the forests, as timber, pitch, potash, tar, and rosin; for the supply of grain is scarcely larger than the home demand, though at one time Finland was regarded as the granary of Sweden for barley and rye. Few fruits ripen except hardy berries; and in the extreme north, vegetation is almost limited to mosses and liverworts. Finland yields some copper, iron, lime, and slate, but produces scarcely any salt, which constitutes one of the principal articles of import. Reindeer, wolves, elks, beavers, and various kinds of game abound; while the numerous lakes, and the adjacent gulfs, supply the inhabitants with abundance of salmon, herring, and other fish. The climate is rigorous, and winter, which lasts seven or eight months, is succeeded by a brief spring, which passes almost suddenly into a short but hot summer

of six or seven weeks, succeeded in its turn by a rainy season, which ushers in the return of cold weather. In the north, the sun is absent during a part of Dec. and Jan., and almost perpetually above the horizon during the short summer. Finland is divided into eight lænes or governments—Nyland, Abo-Bilorneborg, Tawastehuus, Wiborg, Kuopio, St. Michel, Wasa, Uleaborg, which are included in the three dioceses of Abo, Borgo, and Kuopio, and contain in all 214 parishes. The predominant form of religion is the Lutheran, but the Greek Church has of late years been gaining ground. The courts of law are held at Abo (anc. capital), Wasa and Wiborg; and there is one university, founded 1640 at Abo, but removed to the present capital, Helsingfors, 1829. The highest administrative authority is vested in the imperial senate for Finland, consisting of 18 members, nominated by the emperor, and presided over by the gov.-gen. of Finland. The revenue of Finland 1902 was $21,200,000; expenditure the same, debt $27,250,000, army (peace) 5,400 men with 20,000 reserves, navy none, commercial marine 2,153 vessels, and manufactories 7,784 with 91,000 hands. Pop. (1851) 1,636,915; (1880) 2,028,021; (1887) 2,232,378, of whom 85 per cent. were of the native Finnish race, 12 per cent. Scandinavians, and the remainder Russians, Germans and Lapps; (1897) 2,592,778, (1902) 2,781,017.

The early history of Finland is shrouded in obscurity, and little is known of the people before the 12th c. when Eric the Saint, King of Sweden, exasperated by their piratical inroads, undertook a crusade against them, and compelled them, by force of arms, to profess Christianity, The hold which the Swedes then acquired over the country was never wholly lost till 1809, when Sweden secured paece with Russia by the cession of all Finland and the island of Aland; before that time, however, the Russians had at various epochs wrested portions of the Finnish territories from the Swedes, while Finland had been for centuries the perpetual cause and scene of wars between the two nations, The Swedish language had taken such deep root in Finland. that the efforts of the Russian government to displace it in favor of the native Finnish have hitherto had only partial success, and in many parts of the country, the people still openly prefer their old masters. The inhabitants, who call themselves *Suomes*, and are denominated *Tschudes* by the Russians, have, however, no affinity of race with the Swedes, and may be regarded as differing from all other European nations, excepting the Lapps and the Finmarkers, to whom they are probably allied. See FINNS; FINNISH LANGUAGE AND LITERATURE.—See further, Rein, *Finlands Historia* (Helsingf. 1871); Hallsten, *Finlands Historia och Geografi* (1873); Koskinen, *Finnische Geschichte* (Leip. 1873); Armfelt, *La Finlande* (Helsingf. 1874); Ignatius, *Statistiska Anteckningar om Finland* (1876). In 1899 Nicholas II., of Russia, issued decrees violating the constitution of Finland and practically abrogating its autonomy, a policy which immediately aroused the bit-

terest resentment among the people of that country. The Finnish diet refused to recognize the decree; thousands of young men emigrated to America, and the Russian gov.-gen. Bokrikof, who had been sent to enforce the imperial will, was assassinated. The Finns took advantage of the internal troubles in Russia, due to the dissatisfaction of the nation with the war against Japan, to continue the agitation for their rights and privileges; and in 1905, Nov. 4, the Emperor, unable longer to withstand the storm of protest which had been aroused throughout his dominions, issued a ukase restoring and confirming Finland's autonomy and liberty.

FINLAND, GULF OF: eastern arm of the Baltic Sea, between 22° and 30° e. long., and 59° and 61° n. lat. Its coasts are entirely Russian territory. It receives the waters of the great lakes Onega and Ladoga. The water of the gulf is not deep, and only slightly salt.

FINLAY, *fĭn'lĭ,* GEORGE: 1799, Dec. 21—1875, Jan. 25; b. Faversham, Kent, England; of Scottish parents: historian. In 1823 Philhellenism led him to take up his residence in Athens, where he patiently studied the later Greek history. The fruits of his labor and researches are in his *History of Greece under the Romans,* B.C. 146 *to* A.D. 717 (London 1843; 2d ed. 1857); *History of Greece from its Conquest by the Crusaders to its Conquest by the Turks, and of the Empire of Trebizond,* 1204–1461 (London 1851); *History of Byzantine and Greek Empires,* 716–1453 (London, 2 vols. 1853–4); *History of Greece under the Othoman and Venetian Dominion* (1854); and *History of the Greek Revolution* (1861)—all re-edited by H. F. Tozer as *A History of Greece from* B.C. 146 *to* A.D. 1864 (Oxford, 7 vols. 1877).

FINMARK, *fĭn'mârk:* province of Norway, most northerly part of the continent of Europe; between 68° 30′ and 71° n. lat., and 17° and 31° e. long., constituting Norwegian Lapland (q.v.); 18,302 sq. m., of which three-fourths are on the continent, the rest on the numerous islands which skirt its n.w. shores, and terminate in the North Cape. Innumerable fiords and bays indent the coast. The interior is intersected by a snow covered range of mountains, reaching an elevation of 4,000 ft.; the line of perpetual snow being here less than 3,000 ft. above the sea. Agriculture is impracticable above 100 ft.; a few berries are the only fruits that ripen; and though barley, potatoes, and a few other vegetables thrive in some parts, fish and game constitute almost the sole food of the inhabitants. In the north, where are no trees, the turf of the marshes affords good supply of fuel. The thin vegetable mold which covers the stony soil yields grass for the sheep and cows, which graze on the declivities of the rocks skirting the fiords and creeks. Pop. (1900) 32,952.

FINNEY, *fĭn'ĭ,* CHARLES G.: 1792, Aug. 29–1875, Aug. 16; b. Warren, Litchfield co., Conn. He was brought up

in Oneida co., N. Y. Having, after a common education, taught school four years, he entered, when 20 years old, a New England high school and, later, learned also some Latin, Greek, and Hebrew. At the age of 26 he began to study law; and turning to the Bible, with special reference to its bearings on legal questions, was led to study it profoundly, and to interpret it as a judge interprets written laws. From the minister whose preaching he attended he heard theological views expressed which he afterwards learned to call very high Calvinism. Whatever he thus received he judged by the Bible, and then debated with his minister freely and earnestly. 'If' (he thought) 'there is a future life, I need a change of heart in order to be prepared for it.' Convinced that the Scriptures are the word of God, he accepted Christ as his Savior, renounced the world, and, giving up his cherished legal studies, consecrated his life to the work of preaching the gospel. In connection with this personal experience he received (he says) a 'baptism of the Holy Spirit' which, filling him with overwhelming joy, compelled him to cry unto God that the manifestation might be stayed. Beginning his work in prayer meetings and by personal conversations, he soon became a preacher (1824) and at once found revivals of religion accompanying his ministry. 'The themes of his preaching' (he says) 'were the voluntary, total moral depravity of the unregenerate; the unalterable necessity of a radical change of heart by the Holy Ghost, and by means of the truth the divinity of the Lord Jesus Christ, his divine missino, perfect life, vicarious death (as an atonement for the sins of all mankind), and his resurrection; repentance, faith, justification by faith, and the doctrines kindred with these. The means used were: simple preaching; much prayer, public and private, as an indispensable condition of promoting the work; conference among Christians; meetings to instruct earnest inquirers; and personal conversation.' 'It had been' (he further says) 'the common practice to set anxious persons to praying for a new heart, and to using means for their own conversion. This had produced in them the impression that they were willing to be Christians, and were taking pains to induce God to convert them. But I tried to make them understand that God was using the means with them, and not they with him; . . . . . that he was ready and they were not; . . . . .that in praying for a new heart they were trying to throw the responsibility upon God; and their efforts to do duty while they did not give their hearts to him were hypocritical and delusive.' It was under such preaching and personal efforts that those mighty revivals of religion followed which, resulting immediately in the hopeful conversion of thousands, and extending their influences far and wide, formed a striking feature of the half century during which they were continued. Mr. Finney visited England 1849 and 58. His preaching in London drew vast crowds and gained a multitude of converts. In

1832 he became pastor of the Second Free Church in New York, and 1834 of the newly organized Congl. Church in that city, known as the Broadway Tabernacle. In 1835 Mr. Finney was chosen prof. of theology and pastor of the church in the college and seminary then founded at Oberlin, O. After 1860, being 68 years old, he gave up his labors abroad, but for 12 years longer, prosecuted with efficiency and zeal his work at home; then, resigning the pastoral office, he continued his seminary duties until his death at Oberlin, at the age of 83 years; 'during 55 of which his life had been a power in the land.' Among his published writings are: *Lectures on Revivals of Religion* (Boston 1835; many editions; enlarged ed. Oberlin 1868); *Lectures to Professing Christians* (Oberlin 1836); *Sermons* (New York 1839); *Lectures on Theology* (Oberlin 1846, new ed. 1878; repub. London); *Memoirs—an Autobiography* (New York 1876).

Mr. Finney as a preacher was keen, clear, logical, vigorous, simple, pungent—addressing himself to the conscience. As a 'revivalist,' he urged immediate and public self-committal to God before the whole assembly. Some attendant incidents of excitements and bodily manifestation, with his strong, sometimes almost overwhelming urgency in statement, called forth much criticism as 'new measures.' His theology also was impugned by some leading minds. Whatever basis there was for such criticism, the fact remains that the practical results of his life-work increasingly commended themselves, and gave testimony to that work as bringing to bear on the public mind a remarkably heightening and spiritualizing force.

FIN'NISH LANGUAGE AND LIT'ERATURE: an agglutinative language, with an interesting poetic literature. The Finnish *language*, like that of the other Ugrian nations, belongs to the Turanian family of languages, and hence offers some striking points of resemblance to the languages and dialects of the Turks, Tartars, Mongols, Mandshurians, Tungusians, and even Magyars or Hungarians. In Finnish, the nouns are not inflected, but an additional word is required to denote the variations of case, number, and sex. The prepositions and pronouns are suffixed to the words which they modify. The verbs have only two tenses, past and present; the future being expressed by adding to the present some word indicating a future action or state of being. Rask considers the Finnish the most harmonious of tongues. Many Swedish, and a few Russian words have, of course, become incorporated with the language, in consequence of the social and political relations of the Finns with those two countries. To Elias Lönnrot of Helsingfors belongs the merit of rescuing from utter oblivion some of the numerous sagas and songs which had for ages been recited by the Finnish *Runolainen*, or singers, to the sound of the *kantela*, or harp, and thus transmitted from one generation to another. Although his researches were limited to the district of Karelia, in the govt. of Kupio, he obtained numerous songs and proverbs,

and a complete epos, of 32 parts, each containing 200 to 700 verses. This singular monument of the earlier culture of the people was published by him 1835, under the title of *Kalewala* (anc. name of Finland), but it met little notice till the academy of Dorpat made it the subject of discussion at their meetings 1840, and thus attracted the attention of foreign philologists, and led to its translation into Russian, Swedish, and German. The learned Finnish scholar, Carsten, the Grimms, and Brockhaus, agree in regarding the *Kalewala* as a pure epic, and characterize it as a composition possessing a thoroughly Oriental appreciation of nature, an almost unparalleled wealth of images and tropes, great flexibility of rhythm, and a copiousness of synonyms not known in any other northern tongue. There is less unanimity in regard to the character of the plot, for while one critic believes that the incidents refer to definite historical epochs, another regards them as purely allegorical. But whatever discrepancy of opinion there may be in this respect, the *Kalewala* is admitted by all who are entitled to form a judgment of its merits, to be one of the most curious monuments of the kind possessed by any European people. The date of its composition must be referred to a period anterior to the introduction of Christianity among the Finns in the 14th c., while there is even strong internal evidence, from an identity of the names and traditions of the *Kalewala* with many still current in Esthonia, that the poems very probably belong to an epoch anteri or to the immigrations of the Karelians into the districts which they now occupy. The publication of the *Kalewala* has given a powerful impetus to the study of the Finnish language, which the Russian government effectively sustains by encouraging the cultivation and use of their native tongue by the Finlanders. The upper classes still cling to the use of Swedish, but the peasantry and small landed proprietors welcome with avidity every addition to the limited stock of their printed literature. Finnish weekly papers circulate freely among them, and political questions are discussed with an enthusiasm never seen among similar classes in Scandinavia or Russia Proper, but which affords additional proof of the difference in character of the Finns from either of the neighboring nations with which they have been successively incorporated.

The prose literature of Finland deals almost exclusively with religious and moral subjects. The Bible was translated into Finnish 1642, but a part of the Old Testament had been translated a century earlier. Several Finnish poets have acquired reputation of late years, but their works breathe the same melancholy tone which so strongly characterizes the ancient poems of Finland. Lönnrot has made a collection of about 7,000 proverbs (*Suomen kansan Sanalskuja*, 1842), and about 2,000 charades (*Suom. kans. arwoituskia*, 1851). In 1880, about 20 journals or magazines appeared regularly in the Finnish tongue, one of them illustrated. See FINLAND; FINNS.

FINNS, *finz:* geographically, inhabitants of Finland;

but in ethnology, a considerable branch of the Ugrian race, dwelling for the most part in Finland, though with some representatives in Sweden and Norway also. The Ugrians have been classed among the nations said to have a Mongolian origin. Dr. Latham places them among the 'Turanian Altaic Mongolidæ,' and divides them into Ugrians of the East, and Ugrians of the West. The Western Ugrians consist of Lapps, Finns, Permians, and other nations or tribes in the n. and n.w. of Russia, and of the Magyars in Hungary. The Magyars are the most numerous; and next after these, the Finns numbering abt. 2,000,000. All the other Tribes of Western Ugrians together do not comprise as many. The Finns, in common with the other Ugrians, are of the Mongolian type. A recent traveller, Bayard Taylor, describes them as having 'high cheek-bones, square, strong jaws, full, yet firm lips, low broad foreheads, dark eye and hair, and a deeper, warmer red on the cheeks than on those of the rosy Swedes. The average height is, perhaps, not quite equal to that of the latter race, Swedes, but in physical vigor, there is no inferiority, and there are among them many men of splendid stature, strength, and proportion.' Other travellers bear similar testimony to the physical appearance of the Finns proper, or those of pure Finnish blood; but though these form the majority, there are many in the towns especially, who pass for Finns, while in reality, they are quite as much entitled to be called Swedes, or even Russians, on account of the frequent intermarriages of the Finns with individuals of those two nations. The Finns, from having been originally a nomadic race, have for many centuries been stationary and civilized. Long before the arrival of the German and Slavic nations in the north of Europe, the Ugrians, or *Ogres* (for the name so common in fiction is really of historic origin), possessed it, and were gradually pushed further n. and e. by the new invaders. Both Finns and Lapps, there is good reason to believe, originally extended much further s. than they do at present, occupying, perhaps, the whole of Sweden and Norway. 'The Finns,' says Prichard, 'were, in the time of Tacitus, as savage as the Lapps; but the former during the succeeding ages became so far civilized as to exchange a nomadic life for one of agricultural pursuits; while the Lapps have ever continued to be barbarous nomades, as well as the Siberian tribes of the same race—namely, the Woguls and Ostiaks. The Finns, as well as their brethren the Beormahs, or Finns of the White Sea, had probably undergone this change long before the time when they were visited by Otther, the guest of Alfred. When the Finns were conquered by the Swedes, they had long been a settled people, but one of curious, and singular, and isolated character.'

The Finns of our time are doubtless the same race as the *Fesnni* of Tacitus, and the *Phinnoi* of Strabo and Ptolemy, though not occupying the same geographical area. 'The nearest approach to a name at once general and native,' says Dr. Latham, 'is Suomelainen, meaning swamp,

morass, or fen people; the term Finn and Finlander being of foreign origin.' With respect to the social habits, morals, and manners of the Finns, all travellers are unanimous in praising them. They are of cheerful disposition, affectionate toward each other, and honest and honorable in their dealings with strangers. They are also cleanly in their persons, being much addicted to the use of the vapor-bath, to which circumstance may be attributed the strongly marked difference in physical appearance between them and the stunted Lapps, to whom, in language as well as many other respects, they stand closely related.

FINOS, n. *fīn'ōs* [Sp.]: in *com.*, the second-best wool from merino sheep.

FINS [see FIN]: organs adapted for swimming or locomotion in water. The limits of the application of the term are rather vague. It is always applied to the locomotive organs of fishes, when they possess special organs of locomotion, as almost all of them do; and equally to those organs (the pectoral and ventral fins) which are homologous to the limbs of other veterbrate animals, and to those (the vertical fins) which may be said to be superadded to them and to belong to fishes alone; equally to those also which are furnished with rays, having a membrane stretched on them, as is generally the case in all the fins of fishes, and to those which consist, as in some fishes, of a mere fold of the skin, and which are scarcely organs of locomotion. The name fins is given to the locomotive organs of *Cetacea*, but not to those of any other *Mammalia*, even when, as in the case of the hind feet of seals, they approach very nearly to the character of the fins of fishes. Nor is it ever given to the webbed feet of birds. But it is often given to the swimming organs of invertebrate animals, as to the expansions of the mantle which serve this purpose in the *Cephalopoda*, and which are entirely destitute of rays.

FINSBURY, *fĭnz'bėr-ĭ:* or FEN TOWN: parliamentary borough of Middlesex, forming the n. part of London (q.v.).

FIN'SCALE: see RED-EYE.

FINSEN LIGHT: a form of radioactivity employed in the treatment of superficial cancer and of various affections of the skin, especially of lupus. It was introduced into medical practice by the late Dr. Niels Finsen of Copenhagen. Sunlight or the electric arc light may be employed, the latter being preferred since it is always available. The light is passed through a hollow lens filled with an ammonical solution of sulphate of copper which excludes all but the violet and ultra-violet rays (see SPECTRUM), for the efficacy of the treatment depends upon the action of the chemical rather than of the light rays. When sunlight is employed a special appliance is necessary to abstract the heat rays.

FINSTERAARHORN, *fīn'stėr-âr'hŏrn:* highest peak of the Bernese Alps: see ALPS.

FINSTERWALDE, *fĭn′stėr-vâl-dėh:* town of Prussia, province of Brandenburg, on an affluent of the Black Elster, 40 m. n. of Dresden. It has manufactures of cloth and machinery: spinning and weaving are carried on. Pop. abt. 7,500.

FIONNI, Matteo, *mât-tā′ō fē-ōn′nē,* Italian geographer: b. Felizano, Piedmont, August, 1827; d. Bologna 1901. He was instructor in the University of Turin 1848–60, then becoming professor of geodesy at the University of Bologna. Among his works are: *Le Allusione* (1878); *Le Proiezioni delle carte geografiche* with atlas (1878); *Note ipsometrische sopra la regione bolognese* (1883); *Mesure offerte delle carte geografiche* (1887); *Le Projezione cuneiformi* (1889).

FIONS, n. *fī′onz* [Gael. *fein;* Ir. *fion, fians*]: semi-mythical race of warriors of supernatural size, strength, and daring in the poems of Ossian. According to Skene they were of the race which inhabited Scotland and Ireland before the Scots, and Germany before the Germans. According to others, they were Irish, and derived their name from Fion MacCumhal (Fin MacCoul) their leader: see Fenian Society.

FIORD, or Fjord, n. *fĭ-ŏrd′* or *fyŏrd:* in the *Scandinavian tongue,* a name for a bay or inlet of the sea. In North America on the coast of Maine and the coasts of British Columbia and of southern Alaska are bays of this type. Fjords are found on coasts where the land, having been deeply carved either by streams of water or glaciers, is now slowly sinking. In the Norwegian and Alaskan fjords much if not the greater part of the erosion was by ice.

FIORENZUOLA, *fē-ō-rĕn-zô-ō′lâ* (*Florentiola*): town of n. Italy, province of Piacenza, 22 m. w.n.w. from Parma, on the Arda: in a beautiful and fertile plain. It is a station on the railway between Parma and Piacenza, and is also on the ancient Æmilian Way. It is well built, and a place of considerable activity. It formerly had numerous conventual and other ecclesiastical establishments. The principal church is still collegiate, and contains some curious relics of ancient art. There are some interesting relics of mediæval times. It is supposed to occupy the site of the ancient *Fidentia.* Pop. 6,500.

FI′ORIN: see Bent Grass.

FIORITE, n. *fī′ō-rīt* [from *Fiora,* in Tuscany]: pearl-sinter, a siliceous incrustation not uncommon in the vicinity of hot springs and volcanoes.

FIPPIL, v. *fĭp′pĭl* [etym. doubtful]: to whimper; to whine; to act in an unmanly manner.

FIR, n. *fėr* [Ger. *föhre;* Icel. *fura;* AS. *furh,* fir]: a general name for trees having needle-shaped leaves; *Abĭēs,* the genus of fir-trees, sub-ord. *Abĭētin′ĕæ,* ord. *Conĭf′ĕræ;* the *Pinus silves′tris,* ord. *Conĭf′eræ.* Fir-apple, a fir cone. Fir-bob, a fir-cone. Fir-cone, the strobilus or cone-like fruit of the fir. Fir-moss, in *bot., Lycopodium selago.*

Fir-rapes, name given by Lindley to the order *Monotropaceæ*. Fir-in-bond name given to lintels, well-plates, bond-timbers, and all timbers built in walls. Fir-wood, wood of the fir; common deal board.—*Fir* is used often in a sense co-extensive with the widest sense of the word Pine (q.v.), and therefore including a large portion of the Coniferæ (q.v.), or at least the whole of the Linnæan genus *Pinus*. But the name fir is used often also in a more restricted signification; and the trees so designated are those forming the genus *Abies* of some authors, *Abies* and *Picea* of others, which the greater number of botanists have now agreed in separating from *Pinus*. For the Scotch-fir, however, which is a true Pine (*Pinus sylvestris*), described along with its congeners, see Pine. The genus *Abies* is distinguished from *Pinus* by the flat rounded apex of the scales of its cones, and by leaves not in clusters of definite number. Some botanists include the species of Larch (q.v.) and Cedar (q.v.) in the genus *Abies;* but if these be separated, no species with clustered leaves remain in this genus, which then contains only the different kinds of Spruce, Fir and of Silver Fir, or species most nearly allied to those which ordinarily bear these names. All are evergreen. The Spruce Firs form the genius *Abies* of some authors, distinguished by short solitary leaves, scattered all round the branchlets, and by the scales of the (pendulous) cones being attenuated at the apex, and remaining fixed to the axis of the cone. The Silver Firs form the genus *Picea* of some, distinguished by the deciduous scales of the (erect) cones. It being supposed, however, that the Linnæan names had been given through mistake, and that the common silver fir is the true *Abies* of the ancients, and the Norway spruce their *Picea,* Link has attempted, but without being followed by many, to restore these names to their ancient use, and to denominate the genera accordingly.—The Norway Spruce (*Abies excelsa* or *Pinus Abies*) is a noble tree, sometimes attaining the height of 180 ft. with long cylindrical pendulous cones, denticulate scales, and scattered, green, crowded, suddenly pointed, almost quadrangular leaves. It is the *Fichte* of the Germans, called also *Rothtanne* or *Schwarztanne.* Like the other kinds both of spruce and silver fir, it shows the peculiar character of the *Coniferæ* more perfectly than many of the true Pines do, in its perfectly erect stem, from which proceed almost whorled horizontal branches. It is a very beautiful pyramidal tree, and when old, its long branches droop toward the ground. It forms entire forests in the middle and north of Europe and in Asia, chiefly on elevated ridges, though it prefers moist places. It thrives in districts of primitive rock. In some places, it is found within the Arctic Circle. It is of rapid growth, but is believed to live to the age of 400 years. It yields the same products as the Scotch Fir, resin, turpentine, tar, and lampblack (see these titles); but more resin than turpentine. The true Spruce Rosin flows spontaneously

from the bark. The purest pieces are whitish or pale yellow, are sold under the name of Common Frankincense, and used for ointments and plasters, and when melted yield the common Burgundy Pitch (q.v.). The bark of the spruce is a good and cheap non-conductor of heat: the cones are an excellent substitute for tanners' bark. In Sweden and Norway, the inner bark is made into baskets; and the long and slender roots, split and boiled with alkali and sea-salt, are dried, and twisted into cordage, used both for vessels and by farmers. The wood is used for fuel and for house-building; it also supplies masts and spars for ships: it is the White Christiania Deal and Danzig Deal of the market, and is very largely exported from Norway and the Baltic. It is whiter, lighter, less resinous, and more elastic than the timber of Scotch Fir. The sap-wood, while still in a gelatinous state, is sweet, and is eaten fresh in Sweden and Lapland: and the inner bark, in times of scarcity, is mixed with a little flour or meal, of some kind, and baked into bread. The young shoots still covered with their bud-scales are in many parts of Europe used for fumigation. The leaf-buds are employed medicinally in cases of scurvy, rheumatism, and gout. The pollen is often sold by apothecaries instead of the dust of Club-moss or *Lycopodium*.—A very superior variety of this fir is known as the Red Norway Spruce. Dwarf varieties are cultivated among ornamental shrubs. The Black Spruce (*Abies nigra*), of which the Red Spruce (sometimes called *A. rubra*) is regarded as a mere variety caused by difference of soil, and the White Spruce (*A. alba*), form great forests in N. America. The Black Spruce is found as far n. as lat. 65°. Both species are now common in plantations in Britain. Both have quadrangular leaves; those of the Black Spruce are of dark glaucous green, those of the White Spruce are of lighter color. The cones of the Black Spruce are short, ovate-oblong, obtuse, and pendulous, with rounded scales ragged at the edge; those of the White Spruce are oval, tapering to a point with entire scales. The Black Spruce is a valuable timber tree, supplying yards of ships, etc., but its planks are apt to split. The White Spruce is smaller, and the timber inferior. From the Black Spruce the *Essence of Spruce* is obtained, useful as an antiscorbutic in long voyages, and used for making spruce-beer. Spruce-beer is made also by adding molasses or maple sugar to a decoction of the young branchlets, and allowing the whole to ferment. From the fibres of the root of the White Spruce, macerated in water, Canadians prepare the thread with which they sew their birchbark canoes; and the seams are made watertight with its resin. From the twigs of the Oriental Fir (*A Orientalis*), native of the Levant, a very fine clear resin exudes, known by the name of Sapindus' Tears. This fir has very short quadrangular leaves, densely crowded, and uniformly inbricated. The Hemlock Spruce of N. America (*A Canadensis*) forms great part of the forests of Canada and of the n. United States, extending

northward as far as Hudson's Bay. Its timber is not much esteemed, as it splits very obliquely, and decays rapidly in the atmosphere; but the bark is valued for tanning. The leaves are two-rowed, flat, and obtuse. The cones are scarcely longer than the leaves. The young trees have a very graceful appearance, but the older ones are generally much disfigured by remaining stumps of their lower branches. *A. dumosa* of Nepal is nearly allied to the Hemlock Spruce. *A. Douglasii* is a noble tree, attaining a height of 250 ft., which forms immense forests in the n.w. of America, lat. 43° to lat. 52°. The bark, when the tree is old, is rugged, and 6–9 inches thick. It abounds in a clear, yellow resin. The timber is heavy, firm, and valuable; the growth very rapid. *A. Menziessii*, native of n. California, very similar to *A. Douglasii* in general appearance, also produces excellent timber. *A. Brunoniana*, Himalayan species, forms a stately blunt pyramid 120–150 ft. in height, with branches spreading like the cedar, and drooping gracefully on all sides. It is found only at considerable elevations. The wood is not durable, but the bark is very useful. The KHUTROW or HIMALAYAN SPRUCE (*A. Smithiana*, called also *A. Morinda* and *A. Khutrow*) much resembles the Norway Spruce, but has longer and more pendulous branches. The wood is white, and not highly esteemed, though it readily splits into planks. The MOUNT ENOS FIR (*A. Cephalonica*), native of Cephalonia, attaining a height of 60 ft., and a diameter of three ft., yields durable and very valuable timber. The common SILVER FIR (*Picea pectinata*, or *Abies* or *Pinus picea*) has erect cylindrical cones, 5–6 inches long, and two-rowed leaves, with two white lines upon the under side. It forms considerable forests on the mountains of Central Europe and of N. Asia, and attains a height of 150–180 ft., and an age of 300 years. The wood is white, contains little resin, is very soft and light, and is employed for the ordinary purposes of coopers, turners, and joiners, and in ship and house carpentry, also for making bandboxes and for many fine purposes, especially for the sounding boards of musical instruments. The same resinous and oily products are obtained from the Silver Fir as from the Spruce and Scotch Fir, but of superior quality. It yields the beautiful clear turpentine known as Strasburg Turpentine. Very similar to the Silver Fir, but generally of much smaller size, and indeed seldom much above 30 ft. in height, is the BALM OF GILEAD FIR (*Picea* or *Abies balsamea*), native of N. America from Virginia to Canada. The wood is of little value, but the tree yields CANADA BALSAM (q.v.). Besides these, a number of other species of *Picea* are found in the w. part of N. America and in the Himalaya, some of which are trees of great magnitude, yielding excellent timber, as *P. grandis*, Californian tree 179–200 ft. in height—*P. amabilis*, a species much resembling it—*P. nobilis*, majestic tree, which forms vast forests on the mountains of n. California—*P. bracteata*, Californian species remarkable for its slender stem, which

rises to a height of 120 ft., and yet is only about one ft. in diameter at the base—remarkable likewise for the manner in which the middle lobe of each bractea of its cones is produced so as to resemble a leaf—*P. Webbiana*, the HIMALAYAN SILVER FIR, which, in its native regions, fills the upper parts of mountain valleys, and crown summits and ridges at an elevation of more than 10,000 ft., a tree of great size, 35 ft. in girth, and with a trunk rising 40 ft. before it sends out a branch. Other species are *P. Pichta*, native of the Altai Mountains, very nearly resembling the Silver Fir; *P. Nordmanniana; P. Fraserii;* etc.—*P. religiosa* is a tall and elegant tree, native of the mountains of Mexico, with slender branches which are very much used by Mexicans for adorning churches, and with cones shorter than those of any other Silver Fir. *P. Jezœnsis* is a species introduced of late into western lands, from Japan.

FIR'BOLGS: a tribe in the fabulous early history of Ireland, said to have descended from the Nemedians, who, under their leader Nemedius, landed in the island about B.C. 2260; and after 217 years, left it, on account of the oppression to which they were subjected by pirates called the Fomorians. The emigrating Nemedians formed three bands—one went to Trace, and from them the Firbolgs descended; a second to the north of Europe or Lochlan, from whom descended the Tuatha de Danann; and the third to Alban or Scotland, from whom sprang the Britons. The Firbolgs returned to Ireland in three tribes, one of which more especially bore the name Firbolgs, the others were called Firdomnan, and Firgailian. The three tribes, however, were under five leaders, by whom Ireland was divided into five provinces. With Slainge, the first Firbolg king, who began to reign B.C. 1934, and reigned only one year, the Irish historians begin their account of the Irish monarchy and list of kings. The Firbolgs were driven out, after they had been 36 years in Ireland, by their kinsmen, the Tuatha de Danann, from Scotland, they having previously passed over to that country from Lochlan; and these, in their turn, were expelled or conquered by the Milesians. The most recent investigators of the early history of Ireland regard the story of the Firbolgs as having some basis of truth, but no chronological accuracy; the different tribes having long subsisted in the country together, and with varying fortunes as to temporary superiority. See IRELAND.

FIRDUSI, *fēr-dô'sē*, or FIRDOWSI, *fēr-dow'sē* (TUSI), ABU'L-KASIM MANSUR: greatest epic poet of Persia: born between 916–940 A.D. (or between 304 and 328 of the Hedjirah), at Shadab or Rizvan, near Tus in Khorassan; died 1020 (or 411 of the Hedjirah). Whether the name Firdusi (from *firdus*, garden, paradise) was given to him because his father (Fachreddin Ahmad) was a gardener, or on account of the 'Paradise of Poetry' which he had created, is matter of controversy. All that is known of his early life is, that when a boy he was very industri-

ous, and that 'he loved to sit for days alone on the bank of a river.' At the age of between 30 and 40, he went to Gazneh, where Mahmud the Gaznewide resided, great admirer and patron of poetry and the arts. Ere long, Firdusi had an opportunity of displaying both his talent and his extraordinary knowledge of ancient Persian history and legendary lore before the sultan himself, who was so pleased with an episode (the story of Sijavush) written by him at his majesty's order, that he at once paid him a gold dirhem for each couplet, and shortly afterward sent him a great number of fragmentary ancient chronicles and histories of Persia, that he might versify them, and thus carry out the task once attempted by Dakiki—viz., to write a poetical history of the Persian kings from the creation of the world to the end of the Sassanide dynasty (A.D. 636)—the reward to be a dirhem a line. Firdusi spent 30 years over the work, and produced the famous *Book of Kings* (*Shah Nameh*), consisting of 60,000 double lines. Without going so far as many critics have gone, we may fairly rank it among the greatest epics of all nations: the *Iliad*, the *Mahabhárata*, the *Nibelungen*. Truth and fiction, history and fairy lore, all the most gorgeous imagery of the East and its quaintest conceits, together with the homeliest and most touching descriptions of human joy and human sorrow, of valor and of love, the poet has formed into one glowing song. Though abounding—in strict adherence to its sources—in impossibilities and anachronisms (such as Alexander the Great being a Christian, Ki-Khosroo holding the Zend Avesta in his hands—120 years before it was brought to light—Abraham being Zerdusht, etc.), it yet contains not a little of real historical value, quite apart from its being the most faithful mirror of its own times: see SHAH NAMEH. But while Firdusi was 'weaving his poetical carpet', his enemies had not been idle. Unable to attack his genius and his honesty, they attacked his religious opinions; and the sultan, influenced by bigotry and avarice, sent the poet, instead of 60,000 dirhems of gold, so many dirhems of silver. Firdusi was at a public bath when the messenger arrived with the money, and on discovering that it was silver and not gold, that Mahmud had sent him, he divided the amount into three portions, and gave one to the attendant at the bath, another to the messenger, and the third to a man who brought him a glass of sherbet. He then burned several thousand verses which he had written in praise of the sultan, as sequel to the *Shah Nameh*, and composed one of the bitterest satires against him, which he handed over, well sealed, to the king's favorite slave, to give it to him when he might be seized with one of his fits of despondency, as it contained a beautiful panegyric on him. Dreading the sultan's rage, he fled precipitately, first to Tus; persecuted there, he went to Bagdad, where Kadir Billah, the caliph, received him with all honor. But the unrelenting anger of Mahmud followed him thither, and he

removed to Tabaristan, which again he had to leave, seeking another refuge. After eleven years of restless wanderings, he was at last allowed to return to his native place, a broken, wretched old man. Mahmud is said to have repented his cruelty at last, and to have sent a caravan loaded with the costliest goods to Firdusi, to entreat his forgiveness, and induce him to become once more the star of his court. But while the king's messengers entered one gate of the city, Firdusi's bier was carried out to his last abode by the other. His only daughter—an only son of his had died long before him at the age of 37 years—refused the sultan's present, and certain buildings were erected instead, in honor of the dead poet.

The great popularity which the *Shah Nameh* has always had in the East, is to a certain amount also the cause of the uncritical state of the texts. Every transcriber shaped and molded certain passages, or even episodes, according to his own fancy, so that not two out of the innumerable copies are quite alike. Nor are the 60,000 couplets extant in any one instance, the utmost number, including all the most palpable interpolations, never exceeding 56,600. The first complete edition of the text, with glossary and introduction, was published by Turner Macan (Calcutta, 1829, 4 vols.). Another was published by Mohl (Paris 1838-68, 6 vols.), with a French translation, which latter was reissued separately 1876-7. Firdusi wrote another poem, *Yusuf and Zuleikha*, which has been edited by Morley, and a *Divan*, or collection of poems. See Miss Zimmern's translation of the *Epic of Kings* (with introduction, 1882); also the works of Hammer, Wahl, Görres, Morley, Ouseley, Atkinson, etc.

FIRE, n. *fīr* [Ger. *feuer;* Icel. *fyri;* Sw. *fyr;* Gr. *pur*, fire: comp. Gael. *faire*, to watch, a watch-fire]: the result of the combustion or burning of bodies, as coal or wood, a conflagration; severe trial or affliction; flame; lustre; the burning fuel in a grate; anything which inflames the passions; ardor; rage; animation: in *armorial bearings*, denoting those who perform brave actions with ardent courage, their thoughts always aspiring as the fire tends upward: V. to kindle; to set on fire; to take fire; to become irritated; to discharge firearms. FI'RING, imp.: N. fuel; the setting on fire; discharge of firearms. FIERY, FIERINESS, FIERILY: see these titles. FIRED, pp. *fīrd*. FIREARMS, n. plu. cannon, rifles, etc. (see below). FIRE-BALL, meteor resembling a ball of fire passing rapidly through the air; projectiles (see below). FIRE AWAY, *familiarly*, go on as quickly as possible. FIRE-BLAST, a disease to which the hop-plant is liable. FIRE-BOTE, in *English law*, right of a tenant for life or for years, to cut wood on the estate for fuel (See ESTOVER). FIRE-BOX, in a *locomotive engine*, box in which the fire is placed. FIREBRAND, piece of burning wood; an incendiary; one who provokes quarrels. FIRE-BRICK (see BRICK), and FIRE-CLAY, so called from their power of resisting the wasting effects of fire (see FIRE-CLAY, below). FIRE-BRIGADE, organized body of

men for extinguishing conflagrations in towns. FIRE-DAMP, inflammable gas, light carburetted hydrogen (see METHANE), issuing from the crevices in mines (see GAS). FIRE-EATER, one who pretends to eat fire; a fighting character. FIRE-EATING, see below. FIRE-GUARD, wire fencing in front of a fireplace. FIRE-IRONS, the poker, shovel, and tongs. FIREMAN, one who tends an engine or assists in putting out fires. FIREPLACE, the recess in the wall of a room fitted with a flue, in which a grate for fire may be placed. FIRE-PLUG, street hydrant. FIRE-POLICY, the authorized document setting forth the nature and extent of the property insured against fire, the sum to be paid under it in the event of fire, and the annual premium payable by insurer (see INSURANCE). FIRE-PROOF, incombustible (see FIRE-PROOF BUILDINGS: FIRE-PROOFING). FIRE-SCREEN, light movable frame for placing before a fire, partially to intercept its heat or light. FIRESIDE, one's own home; the domestic hearth. FIRESTONE. any stone which stands heat without injury. FIREWORKS, preparations of gunpowder for displays on occasions of rejoicing (see PYROTECHNY). FIRE-WORSHIP, worship of fire practiced by the Parsees (see SUN AND FIRE WORSHIP): for various *superstitions* connected with fire, see BELTEIN; NEED-FIRE. FIRE-WORSHIPPERS: see GUEBERS: PARSEES. GREEK-FIRE, inflammable material that could hardly be extinguished—used first by the Greeks in the 7th c. ST. ANTHONY'S FIRE, disease called erysipelas (q.v.). CURVED FIRE, from a gun so elevated as to cause the projectile to follow a considerable curve. DIRECT FIRE, from a gun pointed straight at the object fired at. ENFILADE FIRE, from a gun fired in the direction of the length of a parapet or a line of the enemy's soldiers. FLANKING FIRE, from a gun fired nearly parallel to a parapet, or to the front of a body of soldiers. OBLIQUE FIRE, striking the object in a slanting direction. REVERSE FIRE, striking the rear of a parapet or body of soldiers. RICHOCHET FIRE, from guns fired with small charges and slight elevations so as to cause a ball to make a series of short bounds. VERTICAL FIRE, from a mortar with a very high elevation in order that the shell may fall almost vertically or straight downward. —SYN. of 'fire, n.': blaze; ignition; combustion; splendor; brilliancy; zeal; love.

FIRE, ORDEAL BY: see ORDEAL.

FIRE-ALARM, ELECTRIC: see ELECTRICAL COMMUNICATION, SYSTEMS OF.

FIRE ALARM TELEGRAPH: a system of telegraphy for conveying a designated signal from the locality of a fire to the engine houses of a fire department. Many patents have been issued for systems or parts thereof, and in their details the apparatus is quite complicated. The system in use in the city of New York illustrates the general features. Throughout the city alarm boxes are established upon street corners. Each box contains an automatic key, which when pulled or moved sends a signal through an

ordinary telegraph circuit to a central office. The signal varies for each box, and consists of a series of taps so ordered as to represent a number different for each box: thus . . . . . meaning 223, etc. When a fire occurs the switch in the nearest box is pulled and the approximate locality of the fire is thus telegraphed to the central office. To avoid error the switch repeats its signal five separate times. In the central office the signal is rung out, and is printed on a strip of paper five times and a shutter is dropped giving the group or circuit number including the box. From the office two other sets of circuits run to all the engine houses. When the operator receives the first alarm he at once throws one set of these circuits into the alarm circuit. The signal is then automatically sent to all the engine houses in the city. Not only is the number rung, but the same current releases the horses by an electric detent mechanism. Should there be any trouble in thus transmitting the alarm a third series of circuits are provided by which gongs in all the engine houses can be rung by hand from the same central office. The five repetitions of the signal, the printing of the signal on paper, and the two independent alarm circuits provide for every contingency or accident that is likely to occur. In some cities the alarm boxes are not locked and are accessible to everyone: it is found that they are not tampered with. In other cities they are locked and keys are distributed throughout the city. Each box contains also an ordinary hand-key so that the officer in charge at a fire can send special signals for assistance to the central office, to be transmitted thence to the engine houses. Each time an alarm is sounded in New York every fireman in the engine houses is awakened and at his station, and every horse is hitched to the engine or other apparatus.

Automatic Fire-detector. A signalling system worked automatically by elevation of temperature is applied to buildings. It may be electrical or mechanical: the first is the favorite. A tube containing mercury may be so arranged that the expansion of the mercury when heated will complete an electric circuit. A number of such tubes with corresponding circuits could be arranged through a building. A bell could then be arranged to be rung on such completion of the circuit. Following these lines numerous variations have been proposed and adopted. Mechanical alarms may sound by the burning of a string, fusing of a fusible alloy, etc., which is made to start a bell mechanism giving a prolonged alarm.

FIRE AND SWORD, Letters of: in the law of Scotland, anciently directed by the privy council to the sheriff, authorizing him to employ force to bring an accused criminal before the court, or to carry out the decree of a court, when there was resistance. By the modern practice in almost all countries, the judge may, of course, always call in the aid of the military to apprehend an accused party, or to enforce a degree where the ordinary means have proved unavailing.

FIRE ARMOR: protective devices for firemen; in many varieties. The cumbrous nature of the majority has militated against their introduction. In one class a bag or vessel containing pure air is attached to and carried by the fireman. From this vessel a tube is carried so as to communicate with the mouth or nose, giving an independent supply of air. An air-tight helmet may receive the air. In this case the air is inspired through the nose and expired through the mouth. Sometimes no helmet is used, and the end of the air tube is held in the mouth; the wearer breathes in through his mouth and out through his nose. A light valve is adapted to the latter to prevent inhalation of smoke In a second class of armor, air is supplied from outside the burning building. The armor includes a helmet to which one end of a long hose is attached. The other end of the hose remains outside of the building, and through this hose the fireman's companions force air by means of a bellows or its equivalent. In a third class a filtering medium is depended on to purify the air. The *fireman's respirator* is of this order. It has been found that wet tissues have a wonderfully efficient action in purifying air contaminated with smoke. A mask glazed and fitting tightly over the eyes protects them from the irritating effects of such air. The lower part of the mask holds wet sponge firmly in place over the mouth and nostrils: through this the air is inhaled. This simple apparatus has proved wonderfully efficient. For protection of the body, ordinary methods not needing description are used. Apparatus of the first class has been prescribed for use in the New York city fire department, but has been practically abandoned. Armor of the second class has been used in France and the respirator has been adopted quite extensively in the western territories.

FIRE'ARMS: implements—usually hollow cylinders, but of whatever form—used in the propulsion of shot, shell, or bullets, to a greater or less distance, by the action of gunpowder or other material exploded by ignition within them. At a more advanced period, an obvious division of the subject into cannon, mortars, and small-arms presents itself; but relative to the infancy of the invention, and amid the obscurity enshrouding it, the natural inquiry is into the origin of firearms generally: this includes the invention of gunpowder, since that bears directly on the gradual introduction of firearms. The widely prevalent notion that gunpowder was the *invention* of Friar Bacon, and that cannon were used first by Edward III. of England, must be discarded. It is certain that gunpowder differed in no conspicuous degree from the *Greek fire* of the Byzantine emperors, nor from the *terrestrial thunder* of China and India, where it had been known for many centuries before its application in modern European warfare. See CANNON; GUN; GUNNERY; GUN MANUFACTURE; ORDNANCE; PROJECTILES, etc.

FIRE'BALLS: projectiles occasionally discharged from guns or mortars, for the purpose either of setting fire to, or of merely illuminating some work, against which hostile

operations are directed. The usual ingredients are—mealed powder, 2; saltpetre, 1½; sulphur, 1; rosin, 1; turpentine 2½; with pitch, tow, naphtha, etc., as circumstances dictate. The use of fireballs has been mostly superseded by the introduction of rockets (q.v.), and incendiary shells (q.v.). Akin to the fireball, was the *fire-arrow* of ancient warfare, which consisted of tow steeped in pitch, rosin, or some inflammable mixture, wrapped round the shaft, and fired to alight among an enemy's works or troops. Greek fire also was discharged on large arrows surrounded by tow, and was shot from *balistæ*.

FIRE-BRICK, a brick capable of sustaining, without fusion, the extreme action of fire. They are used for lining furnaces, and for all kinds of brick-work exposed to intense heat which would melt common bricks. They are made from a natural compound of silica and alumina, which, when free from lime and other fluxes, is infusible under the greatest heat to which it can be subjected. Oxide of iron, however, which is present in most clays, renders the clay fusible when the silica and alumina are nearly in equal proportions, and those fire-clays are the best in which the silica is greatly in excess over the alumina. When the alumina is in excess, broken crucibles, glass-house pots, and old fire brick, ground to powder, are substituted for the common siliceous sand used in the ordinary processes of brick making, but which, in this case, would be injurious, as having a tendency to render the clay fusible. Fire-clay being an expensive article, it is usual, when making fire brick at a distance from mines, to mix with it burnt clay, for the sake of economizing the clay and diminishing its contraction. See Brick.

FIRE'CLAY: variety of clay distinguished from ordinary clay by its refractoriness and infusibility, which render it an excellent material for bricks, crucibles, glass pots, retorts, and similar vessels which are to be exposed to a constant and very high temperature. This difference is due to the purity of fire-clay, or at least to the absence from it of iron, lime, magnesia, and alkalies, in appreciable quantities. It consists of hydrated silicate of aluminum almost entirely, but may contain traces of organic matter, and of some of the bases mentioned above. Fire-clay belongs to the coal formation, and always forms a stratum immediately below the coal. It seems, indeed, to be part of the soil on which the coal vegetation flourished and died. See also Clay. The larger the percentage of silica (sand) in the clay, the more refractory are the articles fashioned from it; and hence sand is often added to clay to increase its fusing point and refractory powers; but a certain proportion of alumina, etc., is required to serve as a flux, to cement and hold together the particles of sand. The proportions of sand and clay are determined by the temperature to which the manufactured article is intended to be exposed; and the fireclay of crucibles or bricks, which are serviceable at a comparatively low temperature, as in

the lining of limekilns, would become soft, and yield in glass or porcelain furnaces.

FIRE-DAMP, the name given by coal miners to carbureted hydrogen or marsh-gas, CH_4. It is an inflammable gas, lighter than air, and is often found in coal mines, it being one of the products of the retarded decay of plant remains. A mixture of fire-damp and air in certain proportions is highly explosive; hence many frightful disasters with great loss of life mark the history of coal mining. See Coal Mining; Methane; Safety-lamp.

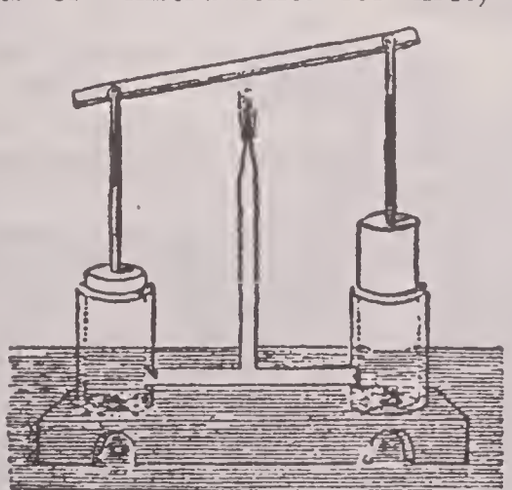
FIRE-EATING: popular term for a variety of feats performed by jugglers with flaming substances, melted lead, red-hot metal, etc. Evelyn, writing 1672, Oct. 8, thus describes fire-eating in his day: 'I took leave of my Lady Sunderland. She made me stay dinner at Leicester House, and afterward sent for Richardson, the famous fire-eater. He devoured brimstone on glowing coals before us, chewing and swallowing them; he melted a beer-glass, and eat it quite up: then taking a live coal on his tongue, he put on it a raw oyster; the coal was blown on with bellows till it flamed and sparkled in his mouth, and so remained till the oyster gaped, and was quite broiled; then he melted pitch and wax with sulphur, which he drank down as it flamed; I saw it flaming in his mouth a good while; he also took up a thick piece of iron, such as laundresses use to put in their smoothing-boxes, when it was fiery hot, held it between his teeth, then in his hand, and threw it about like a stone; then he stood on a small pot, and bending his body, took a glowing iron with his mouth from between his feet, without touching the pot or ground with his hands; with divers other prodigious feats.' About 1818, Signora Josephine Girardelli, who described herself as the 'original Salamander,' performed astonishing feats of this kind in London and other places in England. According to the accounts of her, 'She commences her performances by passing plates of red-hot iron over her legs; she then stands with her feet naked on a plate of red-hot iron, and afterwards draws the same plate over her hair and across her tongue,' etc. About the same time appeared in Paris M. Chaubert, whose astonishing powers of resisting heat attracted the attention of the National Institute. Among other things performed by this person, was his going into a common baker's oven, with a leg of mutton in his hands, and remaining with the oven closed until the mutton was completely dressed. Another of his performances was standing in a flaming tar-barrel until the whole of it was consumed around him. He subsequently exhibited in London.

Many of the feats of this kind are undoubtedly mere tricks or illusions, produced by sleight of hand; others are capable of scientific explanation. There is nothing more wonderful in stuffing blazing tow into the mouth—a common form of mountebank fire-eating—than in eating flaming plum pudding, or in dipping the finger into spirits and letting it burn like a candle. It is well known that the

tongue or the hand dipped in water, may be rubbed with impunity against a white-hot bar of iron; the layer of vapor developed between the hot metal and the skin prevents contact and produces coolness (see SPHEROIDAL CONDITION OF LIQUIDS). Such performances of those of M. Chaubert are explained by the well-known power of the living body to maintain its normal temperature, for a time, independently of the external temperature (see ANIMAL HEAT).

FIRE-ENGINE: machine for throwing a jet of water to extinguish fires. This name was applied formerly to the steam-engine. Machines for the extinguishing of fires have been used from a very early date. They were employed by the Romans, and are referred to by Pliny; but he gives no account of their construction. Apollodorus, architect to Emperor Trajan, speaks of leathern bags, with pipes attached, from which water was projected by squeezing the bags. Hero of Alexandria, in his Treatise on Pneumatics—written probably about B.C. 150—proposition 27—describes a machine which he calls 'the siphons used in conflagrations.' It consisted of two cylinders and pistons connected by a reciprocating beam, which raises and lowers the pistons alternately, and thus, with the aid of valves opening only toward the jet, projects the water from it, but not in a continuous stream, as the pressure ceases at each alternation of stroke.

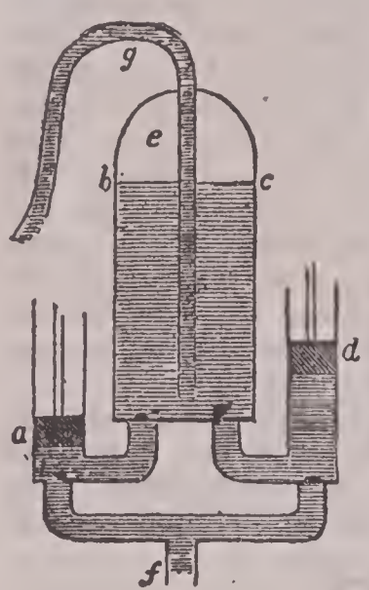
The accompanying copy of Hero's diagram explains itself. Little or nothing is known as to the extent to which engines of this kind were practically used. We have accounts of 'instruments for fires,' and 'water



syringes useful for fires,' in the building accounts of the city of Augsburg, 1518; and in 1657, Caspar Schott describes a fire-engine used in Nuremberg, which must have been almost identical in construction with that described by Hero. It had a water-cistern, was drawn by two horses, was worked by 28 men, and threw a jet of water, an inch in diameter, to a height of 80 ft. It was not until late in the 17th c. that the air-chamber and hose were added; the first being mentioned by Perrault 1684, and the hose and suction-pipe being invented

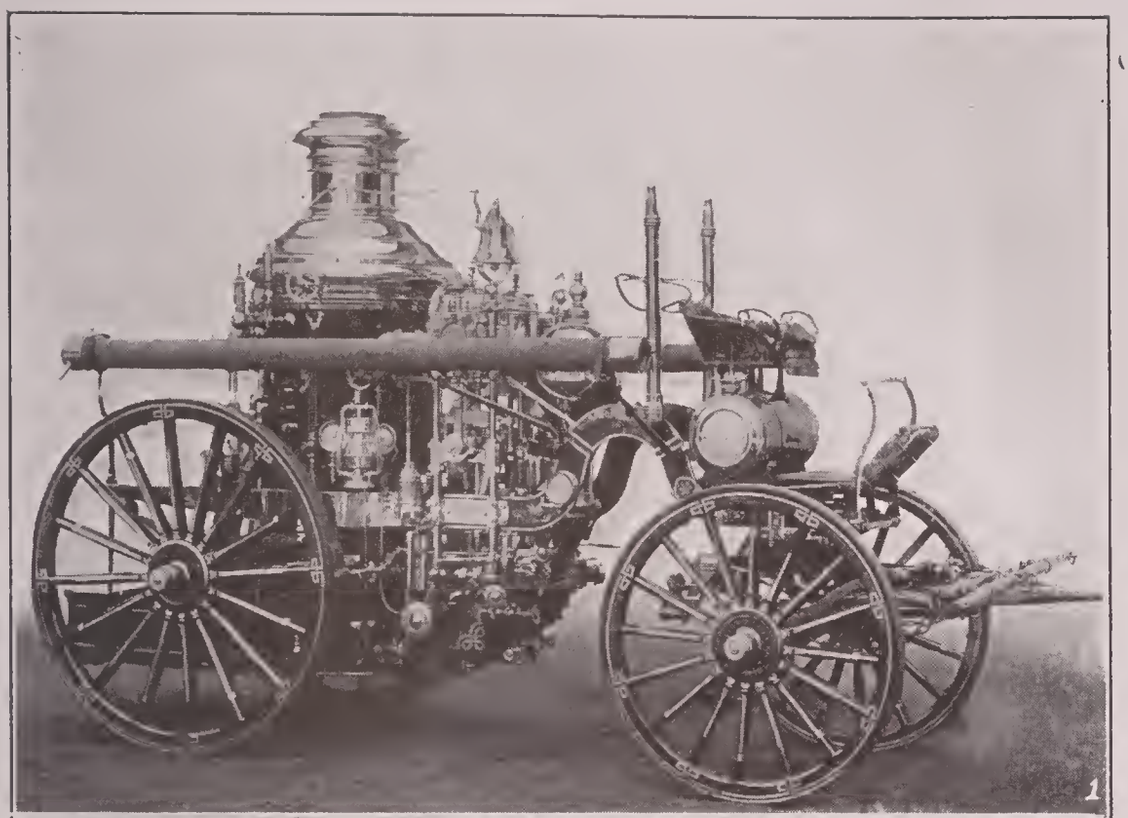
by Van der Heide 1670. In England, hand-squirts were used till the close of the 16th c. They were of brass, and contained three or four quarts of water. Two men held the handles at the sides, while a third forced up the piston. The nozzle was dipped in a vessel of water after each discharge, then raised, and the water again forced out. So clumsy an apparatus could have been but of little service in the fearful conflagrations to which the old English wood-built towns were subject.

With the addition of the air-chamber and hose, and some improvement in the details of construction, the 'siphons' of Hero became the modern fire-engine. The principle of the action of the air-chamber, and of its connection with the pumps, etc., is shown by the aid of the annexed diagram, where *a* represents in section a piston ascending, *d* the other piston descending, *f* the pipe or hose communicating with the water supply, *g* the hose that conveys the issuing stream to the fire, *bc* the level of the water in the air-chamber, *e* the space above filled with compressed air. The rising piston raises the water from *f* to fill its cylinder, the descending piston forces the water contained in its cylinder into the bottom of the air-chamber, and thereby compresses the air in *e*. The pistons rise and descend alternately. The compressed air reacts by its elasticity, and pressing upon the surface *bc*, forces the water through the hose *g*. In the space *e*, above *bc*, the whole of the air that formerly filled the chamber is supposed to be compressed. Assuming this to be one-third of its original bulk, its pressure will be about 45 lbs. to the square inch, and this pressure will be continuous and nearly steady, if the pumps act with sufficient force and rapidity to keep the water at that level. As air may be compressed to any extent—and its elasticity is increased in exactly the same proportion—the force that may be stored in the compressed air is limited only by the force put upon the pumps, and the strength of the apparatus.



Under proposition 9 of the same work, in which 'the siphons used in conflagrations' are described, Hero describes and figures the air-chamber as 'a hollow globe or other vessel, into which if any liquid be poured, it will be forced aloft spontaneously and with much violence, so as to empty the vessel, though such upward motion is contrary to nature.' The globe is represented with a single piston attached for compressing the air. Thus, about 1,800 years elapsed before proposition 9 and proposition 27 of this work were put together for so obvious and useful a purpose as the fire-engine, though the book was known to

FIRE ENGINES.



1. Engine for a City Fire Department.
2. Automatic Chemical Engine and Hose Carriage.

the mathematicians of the period; and when the two were put together, it was probably done by a practical man, who had never heard of the name of Hero.

The more recently constructed fire-engines include contrivances for preventing the entrance of mud and gravel, and for ready access to the valves in case of their being out of order, while the cistern is dispensed with, a hose being carried directly to the water-supply. They are usually drawn by two or four horses, though smaller engines are made to be drawn by hand or by one horse. The hose in England is usually of leather, fastened by metal rivets, instead of the sewing formerly used. In the United States, cotton is woven into a tube by machinery constructed for the purpose. Two such tubes are fitted one within the other, and held together by a solution of India-rubber, which, on consolidating, forms a water-tight layer.

The fire-engines of the London Fire Brigade establishment have usually 6-inch barrels with 7-inch stroke, and throw about 70 gallons of water per minute. Their weight, with implements, firemen, and driver, is about 30 cwt. These are found more convenient for general purposes than larger engines, as they can be drawn at a gallop by two horses for a distance under six miles. Four horses are used for greater distances. When a large engine is required, two of these may be joined together, and throw 180 gallons per minute. The pumps are worked by levers, with long horizontal bars attached, to enable a number of men to work together upon the same pumps. Many larger engines than these have been constructed, and steam has been successfully applied. The first application of the steam fire-engine was made when the Argyle Rooms in London were burned, 1830. Several floating fire-engines for conflagrations near the Thames have been constructed and worked by steam; one of these is capable of throwing 1,400 gallons per minute. The steam fire-engines have recently been greatly improved, and steam of more than 100 lbs. pressure on the square inch can be raised in seven minutes after making the fire: some of these engines throw a jet to a vertical height of about 200 ft., or can drive water horizontally through half a mile of pipe. In the United States all the larger cities and towns have steam fire-engines, often of great capacity as to volume of water thrown, and great power as to distance. The engines are drawn by horses of superior breed, always ready to be harnessed, and perfectly trained. A stationary boiler in the engine is often used to keep a supply of steam in the boiler of the fire-engine at a pressure of about 50 lbs. The engines now in use are of three kinds—rotary engines; engines having reciprocating pumps with fly-wheels; and the same without fly-wheels.

It has been questioned whether, in cases of very intense combustion, a comparatively small stream of water has any subduing effect at all—some assert that it may even in-

crease the conflagration. Various chemical liquids have been proposed as flame-extinguishers; but plain water is still the only power used to any extent.

Fire-Brigades, or Fire-Departments.—For working hand fire-engines, a body of *firemen* are required. The London Fire-brigade was formed 1833. The water-supply in London is not so well managed as the engine-supply, thereby frustrating the exertions of the firemen. At Paris, as on the European continent generally, the fire-engines and firemen are under government control; and the *sapeurs pompiers*, or firemen, are empowered to enforce the assistance of any people they can find in the streets.

In many continental towns, fire-watchmen are stationed in commanding situations, such as church-towers; and their duty is to ring a fire-bell, or otherwise give the alarm, immediately upon observing a conflagration.

United States. Public fire departments have been developed in this country to a remarkable degree. The scope of the organization and the types of apparatus to be employed are to be determined by the area, height and character of the buildings to be protected and the nature of the water supplies available. The apparatus of a public department usually consists of steamers, fire hose and play pipes carried on carts and laid in folds for quick removal, ladders for gaining access to the various floors and roof of a building from the exterior (these include extension ladders operated by hand, hydraulic, steam and electric power), chemical engines drawn by horses and discharged through lengths of hose carried into a building in same manner as the larger hose streams from the steamers, hand chemical extinguishers of the carbonic acid gas type, water towers for projecting powerful hose streams within a building from points opposite upper story windows, and also numerous and varied minor and subsidiary devices. All effort is made to bring the department into action on the scene of the fire at the earliest possible moment, to which end are used the electric fire alarm systems, both automatic and manual. Quick hitching apparatus is employed for almost instantaneously adjusting harness to the horses in the houses in which the apparatus is maintained. The horses are trained to take their places at the pole on alarm of fire, at which time an electric device releases their stall fastenings. The main doors are opened by the operation of a release mechanism, and the firemen sleeping on the floors above the apparatus have their garments so designed and arranged that, in event of a night fire, they can clothe themselves almost instantly, and, descending to the main floor by sliding poles, take their positions on the apparatus and emerge from the house in a few seconds. In thus promptly reaching the fire, and giving it little chance to extend beyond the point of control, our public fire service deserves greatest credit.

One portion of the apparatus above mentioned must be specially pointed out as regards its efficiency. From 50

to 75 per cent. of the fires of record controlled by public departments are to-day extinguished by the small chemical engine, whose great efficiency in the hands of a fire department is due to the fact that the apparatus is light, and in responding to a fire is prompt in arrival. The hose is small and easily handled under the extra high pressure which prevails and hence is the first to be taken into the building, reaching the scene of the fire early enough in most cases to bring about the remarkable percentage of successes above noted.

FIRE'-ESCAPES': apparatus for escape of persons from upper flats or floors of buildings when the lower are on fire. An immense number of contrivances have been proposed; of two distinct kinds—one for affording aid from outside, and the other for enabling those within to effect their own escape. Of the latter, the simplest is a stout cord or small rope, firmly attached to the window-sill of every sleeping-apartment, and coiled up within. A rope one-quarter or three-eighths of an inch thick, and knotted at intervals of about 12 inches, is well adapted for the purpose. A good quarter-inch sash-cord if new will support from three to four cwt. or more. A man with moderate 'nerve' may let himself down by such a cord, either by placing his feet against the wall and bringing 'hand over hand' down upon the knots, or by clinging with his feet and knees to the rope as well as with his hands. A man may let down a woman or child by means of a sack at the end of the rope, or simply by fastening them to the end, and letting the rope pass through his hands, aided if necessary by the friction of the window-sill, if it be allowed to bend over it. A rope coiled upon a drum inside a dressing-table, with a winch-handle to uncoil it, is another form. A pulley fixed to the window-sill, over which runs a rope with a chair or simple board to sit on, is another.

In tall houses some means of escape from every sleeping-room should be provided, and the inmates should be thoroughly prepared by knowing beforehand how to act in case of a fire cutting off communication with the stairway. In a row of houses with projecting balconies, a board of sufficient length to reach from the balcony of one house to the next may be kept in each room. An exit by the roof or from the window on to the parapet affords a ready means of escape from a top-story, and should always be provided in tall houses. In case of emergency, when no provision has been made, the bedclothes and curtains may be securely tied together to form a rope; or as a last resource, the bedding may be thrown out of window to form a cushion to alight upon in case of the cord or bedclothes being too short to reach the ground. If there be no time to extemporize such cordage, and it should be necessary to drop directly from the window down upon the mattresses previously thrown down, it would be better to hang by the hands from the window-sill and then drop, than to jump direct. In all such cases, self-control is of the utmost importance.

FIRE EXTINGUISHER.

Fire-escapes, to be used from without, consist either of simple ladders kept in some public buildings or other convenient stations, or a series of ladders that can be joined together; of poles with baskets attached; of ropes with weights at one end, that they may be thrown or shot into windows; of combinations of ladders, ropes, bags, baskets, nets, etc. The fire-escape now generally adopted in London by the Soc. for the Protection of Life from Fire is a light carriage or framework on wheels, to which a series of ladders, etc., are attached. It is thus described by the society: 'The main ladder reaches from 30 to 35 ft., and can instantly be applied to most second-floor windows by means of the carriage-lever.' This projects on the opposite side to the ladder like the shafts of an ordinary carriage, and works upon the axle of the wheels as a fulcrum. 'The upper ladder folds over the main ladder, and is raised into position by a rope attached to its lever-irons on either side of the main ladder; or, as recently adopted in one or two of the escapes, by an arrangement of pulleys in lieu of the lever-irons. The short ladder for the first-floors fits in under the carriage, and is of the greatest service. Under the whole length of the main ladder is a canvas trough or bagging made of stout sail-cloth protected by an outer trough of copper-wire net, leaving sufficient room between for the yielding of the canvas in a person's descent. The addition of the copper-wire is a great improvement, as, though not affording an entire protection against the canvas failing, it in most cases avails, and prevents the possibility of any one falling through. The soaking of the canvas in alum and other solutions is also attended to; but this, while preventing its flaming, cannot remove the risk of accident from the fire charring the canvas. The available height of these escapes is about 45 ft.; but some of them carry a short supplementary ladder, which can be readily fixed at the top, and which increases the length to 50 ft.' The society has more than 120 of these fire-escapes stationed in different parts of London. They stand in the roadway, and are each under the charge of a conductor during the night. Almost every house in London is within two or three minutes' run of one of these. Since 1836, when the operations of the society began, they have saved thousands of lives. At one fire, nine lives were saved by one man and fire-escape. When required, the apparatus is run to the burning house, the main ladder standing nearly upright all the while. It is then directed to the required window at a considerable inclination, and the attendant ascends the ladder, and helps the inmates either to descend by it, or if they are unable to do this, he lets them down by the canvas trough, which forms an inclined plane, along which they may easily and safely descend with the aid he is enabled to afford them.

FIRE EXTINGUISHER: apparatus to extinguish fires by pouring on or into them streams of carbonic acid, sul-

phurous acid, and other gases which do not support combustion. There are various forms, and their value is chiefly in the earliest stage of a fire, or where air has not free access, i.e. in confined rooms or places in houses. A later invention is a sort of fire hand-grenade, a glass bottle, full of chemical fluid which, when released by the breaking of the bottle, emits dense volumes of gases that stifle the flames.

FIRE'FLY: name common to all winged luminous insects, at least to all that possess much luminosity. Except the lantern fly (q.v.), they all are coleopterous, and belong to two nearly allied tribes, *Lampyrides*, to which the glowworm (q.v.) also belongs, and *Elaterides*, to which belong the skipjack beetles, and of which the larvæ are well-known to farmers as wire-worms. The male glowworm, which alone is winged, has too little luminosity ever to receive the name of firefly, but the fireflies of the south of Europe (*Lampyris Italica*) and of Canada (*L. corusca*) are nearly allied to it: see GLOWWORM. Fireflies are seen only in the most southern parts of Europe. They abound in almost all the warmer parts of the world, and, in the warm summers in the United States and Canada, presenting a brilliant spectacle when glancing about in numbers amid the darkness of night. The light is yellow and is emitted more frequently while flying. Their flight is slow, and the light is given at regular intervals of two or three seconds. The insect is a little beetle, with soft elytra, of a light brown color, marked with red, and striped; the light proceeds from the last three segments of the abdomen, which are of delicate cream color by day. At night, these three segments are faintly bright at all times. If this part be plucked off and crushed, patches of brilliance appear for a few moments among the flesh, but they gradually die away. They often hover in hundreds over wet and marshy ground, or above a river, or a large field. Still more brilliant are the fireflies of tropical regions, belonging to the tribe *Elaterides*, as the firefly of the W. Indies (*Elater noctilucus*), which gives out its light chiefly from two eye-like tubercles on the thorax. The light is so powerful, that small print may be read by it; and this becomes quite easy if a few of the insects are inclosed in a small glass vessel. They are frequently employed —particularly in San Domingo—to give light for household purposes; and they are used for purposes of decoration on festival days by women, who attach them to their dress or to their hair. One which had been accidently brought alive to Paris, once astonished and alarmed the Faubourg St. Antoine. These insects are caught in some parts of the W. Indies—a torch being used to attract them —and brought into houses to destroy mosquitoes, which they eagerly pursue and devour. See LUMINOSITY OF ORGANIC BEINGS.

FIRE INSURANCE: the business of fire insurance in the United States may be roughly divided into three

classes—that carried on, first by the stock companies, second by the mutuals, and third by the factory mutuals. By far the greater part of the risks insured are written by the companies in the first of these classes. As there is no one State in the Union in which all of the fire insurance companies, both foreign and American, carry on a regular business and hence make official reports, it is not possible to determine the exact volume of business transacted. Of the state reports those issued by the insurance superintendent of the State of New York are probably the most comprehensive, and from these compilations it appears that in the year 1902 the companies that were then authorized to do business in that state, almost entirely stock companies, had written risks in the United States to the total amount of $21,320,333,036. This report of the year 1902 did not include the writings of quite a number of stock companies having their offices outside of New York, and carrying on a local rather than a general business, nor did it include, to any great extent, the writings either in New York State or elsewhere, of the ordinary mutuals or the factory mutual fire insurance companies. If these several additions were made it is not improbable that the aggregate writing in this country of all of the insurance companies during the year 1902, would be found to be between $23,000,000,000 and $24,000,000,000, a sum which must represent a very considerable percentage of the value of all the property in the United States that is liable to destruction by fire.

There were in 1902 approximately 150 stock insurance companies that reported to the insurance superintendent of the State of New York. Of these 36 were European companies that had agencies in this country and the remainder were domestic corporations. The tendency in the development of the fire insurance business in the United States appears to be toward concentration under the control of a relatively few large corporations, these located in special financial centres. During the decade of 1871–80, many more fire insurance companies reported to the New York insurance superintendent than reported to that official in 1902, although in the interval the volume of annual writings increased more than threefold. Those American companies that have the largest share in this business are corporations having their chief offices in New York, Philadelphia, and Hartford, the capitalists of the last-named municipality showing an aptitude for this class of business, as clearly specialized as is that of the manufactures of Fall River or Pittsburg.

FIRE ISLAND: strip of wave-made beach 40 m. long, averaging ½ m. wide, off Long Island, between Great South Bay and the Atlantic Ocean; belonging to Suffolk co., N. Y. The beach took its name from the fires built there as signals to vessels during the war with England 1812. Between the beach and the mainland, in Great South Bay, are five small islands; but there is now Fire Island proper. About 45 m. e. of the inlet to the bay the

beach joins the mainland. The entire strip forms a popular and well-known watering place, readily reached from Babylon, L. I., extremely salubrious, and with air affording a positive specific for hay fever. There is a large hotel near the Babylon ferry, and within a few rods to the e. a light house 185 ft. high with a revolving light and 8 refractors of French ground glass that alone cost $17,000.

FIRELESS STEAM ENGINE: locomotive engine, driven by steam produced without a fire on the engine; is for many purposes a desideratum. For street cars especially is it desirable, and the use of electricity for their propulsion is an indicator of this need. By dispensing with a fire the weight of coal and the annoyance of ashes and the services of a stoker all are avoided. The Fireless Steam engine simplest in principle was the invention of Dr. Emile Lamm of New Orleans. The apparatus included a boiler and ordinary steam engine. The boiler was first partly filled with water, and into this steam was injected at high pressure until the temperature rose to 360° or more, and until the pressure was about 150 lbs. to the sq. inch. It is clear that thus a large amount of steam would be converted into water, and at such a high temperature as to be ready for reconversion into steam by reduction of pressure. On opening the throttle-valve the steam would at once enter the cylinder of the engine, and would drive it until the pressure fell to nearly the atmospheric limit, the temperature of the water also decreasing. In this way the highly heated water was made to represent a storage reservoir of steam. In practical working it was found that small engines could run 5½ m. with one charge; recharging required about 2 minutes. The steam pressure ran from 60 to 155 lbs. When it fell to the first named figure the boiler was recharged. Street cars were arranged to be thus driven, a long cylindrical boiler being used. The invention has not been extensively applied. The Carrolton R. R. Co. of New Orleans had ten engines in operation for some time.—The *Soda Engine* of Mr. Honigmann involves the use of strong solution of caustic soda. The boiler contains a compartment representing the furnace, which contains the soda. It is charged hot. By its sensible heat it soon produces steam, and the engine can be started. The exhaust steam instead of being allowed to escape is carried into the soda chamber. There it parts with its sensible and latent heat, and raises the temperature of the soda lye by combining chemically with it. The solution is so strong that it can thus absorb a large quantity of water and develop from the combination a great increase of temperature. Approximately the temperature attained is equal to that of the boiling point of the soda solution. For street car propulsion, for work in mines, and in submarine torpedo-boats, where economy of air is necessary, or where it is desirable not to contaminate the atmosphere, these engines find their uses.

FIRE'LOCK: name applied to the old musket, when introduced 1690, which produced fire by the concussion of

flint and steel; distinguished from the *matchlock* previously in use, which had been fired by the insertion of a lighted match at the powder pan. Writers of the earlier part of the 18th c. called firelocks 'asnaphans'; a word obviously corrupted from the Dutch *snaphaan*, and leading to the inference that they were brought to England by William III. and his Dutch auxiliaries. Their invention is, however, involved in obscurity. The weapon was superseded before 1830 by the percussion musket; which, in its turn, has now yielded to the rifle. (g. v.)

FIRENZUOLA, *fē-rĕn-zô-ō'lâ*, Angelo: 1493—prob. 1542, 3, or 4; b. Florence; author. After studying law at Florence and Perugia, he went to Rome, anticipating a brilliant legal career, but shortly abandoned the eternal city, disappointed in hope and shattered in health. He seems finally to have enrolled himself among the monkish brotherhood of Vallombrosa, and to have gained influence, in spite of his extreme license of morals, and of writing. His chief works are a spirited paraphrase of the *Golden Ass of Apuleius*—considered by his countrymen to excel the original in nerve and beauty of language; *I Discorsi degli Animali*—containing political lessons as uttered by his animal orators; *I Ragionamenti*, in close imitation of the *Decameron* in impurity of sentiment and classic purity of language; *Il Trattato della bellezza delle donne*, eulogium of woman. The best edition of his works is that of Florence (1763, 3 vols.).

FIRE-PROOF BUILD'INGS: structures able to resist fire. The problem of constructing buildings proof against all risk of conflagration, has not yet been solved; as the liability though greatly diminished is not entirely averted. Precautions against fire must not be neglected in even a 'fire-proof' building. The most destructive fire in London since 1666 was that at Cotton's Wharf, 1861, the warehouses of which were called 'fire-proof.' The great fury of this conflagration was due to the nature of the goods that were stored—especially saltpetre, which though itself incombustible, intensifies immensely the combustion of other substances.

The nearest approximation to fire-proof construction may be obtained as follows: the walls should be of stone or brick, and any ties, lintels, etc., required in the construction should be of iron. The staircases should be of iron or stone, and the floors or landings of tiles, concrete, or stone. Wherever wood is inevitably used, it should be prepared with silicate of soda (see Fire-proofing). Instead of wooden joists to support the floors of each story, arched stone or brickwork should be used, and this should be put together with sufficient care to be independent of the mortar. The roof should be constructed in like manner, wooden rafters being excluded. The doors should be of iron, and the security would be much increased if the doors between any two apartments containing combustible materials were double, with a space between them equal to the thickness of the walls. Of course, it is not prac-

ticable to carry out all these precautions in a dwelling-house, but the danger from fire may be considerably diminished by attending to some of them. Wooden staircases especially are dangerous. The most important conditions for a warehouse are, that each apartment shall be separated from the next by stout walls of non-conducting materials, and especially that each shall be as nearly as possible air-tight; and whenever, from the nature of the goods, ventilation is required, it should be obtained by periodically opening the doors and windows. If this latter condition is fulfilled, any fire would extinguish itself, unless there be with the combustible goods some oxygen-giving substance, such as saltpetre, chlorate of potass, or other nitrates or chlorates.

At first sight, it seems that a warehouse built entirely of iron, would be effectually fire-proof, but this is far from being the case. In the first place, iron conducts heat more readily than any other material used in building; secondly, cast-iron is liable to crack and split when suddenly heated or cooled. Iron supports may, under some circumstances, be even more objectionable than wood, for if the water from a fire-engine were to play upon a heated cast-iron girder, it would probably give way immediately, while a stout wooden beam might be extinguished before being burned through. When buildings supported by iron girders are burning, they are far more dangerous to firemen than those with wood, as iron girders split and fall without visible notice. It is on this account that floors of arched masonry are recommended. In great fires, the heat is sufficient to fuse iron. In the great Chicago and Boston conflagrations, it was found that the solid granite-brick, and iron, disintegrated and crumbled in the intense heat, and were no hindrance to the progress of the flames.

Without going to the expense of making warehouses, and manufactories 'fire-proof,' certain precautions not of a costly nature might be adopted, for merely checking the conflagration until the arrival of fire-engines. Among these simple measures, are iron doors hinged on stone between different departments; a sufficient deafening not easily destructible between the ceiling of one story and the floor of that above; and stone stairs. For rendering timber difficult of combustion, see FIRE-PROOFING.

FIRE'-PROOFING: art of rendering substances incombustible. Attempts have continually been made to render cotton, linen, and other textile fabrics, timber, etc., incombustible; but thus far with only partial success. There are many means by which fabrics may be prevented from flaming, their combustion being reduced to a slow smouldering. By moistening the fabric with a solution of any saline substance, which, upon drying will leave minute crystals deposited in or between the fibres, its inflammability will be greatly diminished, but the salt imparts a degree of harshness to the fabric, and in many cases weakens the fibres. Alum, sulphate of zinc, and sulphate of soda have been used, and are effectual to prevent flaming,

but they weaken the fibre. Common salt does the same. Phosphate and sulphate of ammonia are less objectionable on this account, but the former decomposes by contact with the hot iron in ironing. Tungstate of soda has been proposed, and is said to have no injurious effect on the fibre. Sulphate of ammonia, chloride of ammonium (sal ammoniac), and borax, are among the best fitted for domestic use, though not unobjectionable. For made-up clothing, borax is, perhaps the best, as it is most effectual in its action, and least injurious to the appearance of the article, though it is stated to have some weakening effect on the fibre in case of a tearing strain. Wood has been treated with milk of lime, alum, sal ammoniac, sulphate of ammonia, chloride and sulphate of zinc, sulphuret of lime and baryta, etc., its *inflammability*, but not its *combustibility*, is thus destroyed. Like the fabrics, when similarly treated, wood smoulders slowly. The most efficient protection to wood is silicate of soda. If planks of moderate thickness be brushed three or four times over, on each side with a strong solution, they are rendered almost incombustible; they will burn only when very intensely heated. The silicate fuses and forms a glass which envelopes the surface and even the internal fibres if the wood be sufficiently saturated, and thus seals it from the oxygen of the air.

FIRE-PROOF SAFES: see SAFES.

FIRE'-RAISING, in the Law of Scotland: equivalent term for arson (q.v.). Attempting to set fire to houses, crops, etc., is a distinct crime from arson (q.v.), or the actual destruction of property by fire. The attempt to burn growing crops of grain, etc., is a felony. These offenses are also misdemeanors at common law. Inciting others to commit fire-raising is an indictable offense; and, in some old cases, persons have been punished for the mere threats to commit the offense, without being guilty of any overt act.

The *English* Act 9 and 10 Vict. c. 25, declares that whoever shall maliciously, by the explosion of gunpowder or other explosive substance, destroy or damage any dwelling-house in which there is any person at the time, is guilty of felony. Blowing up a building with intent to murder, and thereby endangering life, or casting upon any person any explosive or corrosive fluid whereby grievous bodily harm is occasioned him, and similar offenses, are declared to be felony. Attempting any of these offenses subjects the perpetrator to a minor punishment. The manufacturing or having in possession any explosive substance, or dangerous or noxious thing, or any machine or instrument, for the purpose of committing any of the above offenses, is a misdemeanor.

FIRE-SHIP: vessel, usually old, filled with combustibles, sent in among a hostile squadron, and there fired, in the hope of destroying some of the ships, or at least of producing great confusion. Livy mentions the use of fire-

ships by the Rhodians, B.C. 190; but among the first occasions in modern times when they are known to have been employed, were by the Dutch in the Scheldt during the War of Independence in the Netherlands, and, shortly afterward, by the English, 1588, against the Spanish Armada. The Chinese tried them against the British fleet before Canton 1857, unsuccessfully. The service of navigating one of these ships into the midst of an enemy, there firing it, and then attempting to escape, is always fraught with great risk of failure and disaster.

FIRES, NOTABLE. Among the more important and disastrous conflagrations of history were the following:

64. Rome burned for eight days; most of city destroyed.
1086. London; great part of the city destroyed.
1212. London; great part of the city destroyed.
1666. London; Great Fire, 2–6 September; 436 acres; loss $50,000,000.
1794. London; 650 houses burnt; loss, $5,000,000.
1812. Moscow fired, 14–20 September; loss, $150,000,000.
1835. New York, 16 December; loss, $15,000,000.
1842. Hamburg, 5–7 May; loss, $35,000,000.
1845. New York, 20 July; loss, $7,500,000.
1861. London, Tooley Street, 22 June—22 July; loss, $10,000,000.
1871. Paris, Communist outrages in May; loss $150,000,000.
1871. Chicago, 8–10 October; 2,124 acres; loss, $200,000,000.
1872. Boston, 9–10 November; loss, $75,000,000.
1903. Chicago, 30 December, Iroquois Theatre; 531 lives lost.
1903. Baltimore, Md., Feb. 7–8; loss, $70,000,000.
1904. Aalesund, Norway, Jan. 23; 10,000 people homeless.
1904. Rochester, N. Y., Feb. 26; loss, $3,200,000.
1904. New York, steamer General Slocum, June, nearly 1,000 lives lost.
1906. San Francisco, Cal., April 18; earthquake and fire; loss about $300,000,000.

FIRISHTA, MOHAMMAD KASIN HINDU SHAH: Persian historian: b. toward the end of the 16th c. (1570?) at Astrabad, on the Caspian Sea; d. (probably) soon after 1612. At a very early age, he went with his father (Gholam Ali Hindu Shah) to India, and when 12 years old, was at Ahmednuggur, in the Deccan, sharing the instruction which his father gave to Prince Miran Hussein Nizam Shah. He afterward became capt. in the body-guard of Murteza Nizam Shah; and when this king was deposed by his own son, Firishta's former fellow-student—who, in his own turn, was deposed and murdered in less than a twelvemonth afterward—Firishta went to Bijapore (1589), where Ibrahim Adil Shah II., the reigning monarch, received him with great honor. Firishta soon after his arrival, took part in an action against Jumal Khan, in

which he was wounded and taken prisoner, but soon escaped. His great work is the *Tarikhi Firishta*, or History of the Mohammedan Power in India, which he finished 1609. 20 years were spent in its preparation, and the number of books used for, and partly embodied in it—special histories of certain periods and provinces—amounts, according to Firishta himself (Introduction), to 35; but 20 others are quoted in the work. It consists—besides a preamble or introduction on the Progress of Mohammedanism in India, and a final treatise on the geography and the climate of India—of 12 divisions, treating of the kings of Ghinzi and Lahore, Delhi, the Deccan, Guzerat, Malwah, Candeish, Bengal and Behar, Mooltan, Sinde, Cashmere, Malabar, and of the saints of India. Written with an impartiality, simplicity, and clearness rare in an Eastern work, this history has become a standard work on the subject, into which it was the first to enter at length. Single portions have been translated by Dow, Scott, Stewart, Anderson, etc.; but the whole work, edited first by J. Briggs (Bombay 1831, fol. 2 vols.), was also translated by him (London 1832, 8vo, 4 vols.). A fuller account of Firishta's life and writings, by the same author, is in Transactions of the Asiatic Society, vol. II.

FIRKIN, n. *fėr'kĭn* [Dut. *vier*, four, and old Dut. *kin* for *ken*, little]: old measure of capacity containing nine gallons (old ale and beer measure). But previous to 1803 it had two values, being estimated at eight gallons in old ale measure, and at nine in old beer measure. The firkin is equivalent to 9$\frac{1}{8}$ imperial gallons: see GALLON. The word is applied also to a small barrel or covered tub used for butter, etc.

FIRLOT, n. *fėr'lŏt* [AS. *feortha*, the fourth, *hlot*, a portion]: old Scotch dry measure, of which there were four in a Boll (q.v.). Though differing in value for different substances and places, its relation to the boll remained invariable: see PECK.

FIRM, a. *fėrm* [F. *ferme*—from L. *firmus*, steadfast, strong: It. *fermo*]: closely compressed; hard; solid; constant; steady; resolute: N. the name or title under which a company transacts business; a partnership (q.v.): V. in *OE.*, to confirm; to establish; to fix steadily. FIRM'LY, ad. *-lĭ*. FIRM'NESS, n. stability; steadfastness; constancy; hardness. FIRM'ITUDE, n. *-ĭ-tūd*, in *OE.*, the state of being firm; firmness; strength.—SYN. of 'firm, a.': fast; fixed; unshaken; compact; dense; stable; stanch; robust; strong; certain; steadfast.

FIRMAMENT, n. *fėr'mă-mĕnt* [F. *firmament*—from L. *firmamen'tum*, a support, a prop—from *firmus*, firm: It. *firmamento*]: word in use of old to signify the seeming vault of heaven; the sky; an expanse or wide extent. FIR'MAMEN'TAL, a. *-mĕn'tăl*, pertaining to the firmament.—The word *Firmament* found its way into English from the Vulgate, which renders the Septuagint *Stereoma* and the Hebrew *Rakia*, by the Latin *Firmamentum* (Gen. i. 6).

Rakia (from the verb *raka*, to beat or strike out) signifies whatever is expanded or stretched out, and was specially employed by the Hebrews to denote the hemisphere above the earth, compared (Ex. xxiv. 10) to a splendid and pellucid sapphire. Elsewhere (Ez. i. 22–26) it is spoken of as the 'floor' on which the throne of the Most High is placed. Hence it follows that the notions of solidity and expansion were both contained in the Hebrew conception of the firmament. The blue ethereal sky was regarded as a solid crystal sphere, to which the stars were fixed (compare the *cælo affixa sidera* of Pliny, ii. 39, and xviii. 57) and which was constantly revolving, carrying them with it. This sphere or firmament divided 'the waters which were under the firmament from the waters which were above the firmament;' and the theory of the phenomena of rain, etc., was that there were 'windows in heaven'—i.e., in the firmament, through which, when opened, the waters that were above the firmament descended. 'The same day were all the fountains of the great deep broken up, and the windows of heaven were opened,' Gen. vii. 11. The notion of Greeks, and other early nations, was essentially the same. In the progress of astronomical observations, it was found that many heavenly bodies had independent motions, inconsistent with the notion of their being fixed to one sphere or firmament. Then the crystalline spheres were indefinitely increased in number, each body that was clearly independent of the rest having a sphere assigned to it, till a complex system was introduced, capable of being fully understood only by the philosophers who formed it: see PTOLEMAIC SYSTEM. It was long before men formed the idea of the possibility of a body being maintained in motion in space without a fixed support, and considering the number of phenomena of which the hypothesis of a crystalline firmament offered an apparent explanation, we must regard it as having been in its day a curious and ingenious speculation.

FIRMAN, n. *fėr'măn* [Turk. *firmaun;* Pers. *farman*, a mandate, order]: word used by the Turks to denote any official decree emanating from the Ottoman Porte. The right of signing any firman relating to affairs connected with his special department is exercised by every minister and member of the divan, but the office of placing at the head of the firman the *thograï*—a cipher containing the name of the sultan in interlaced letters, and which alone gives effect to the decree—is committed to the hands of a special minister, who is called *nichandji-effendi*. The name applied to such decrees as have been signed by the sultan himself is *hattisherif*. The name firman may signify also a more formal kind of Turkish passport, granted only by the sultan or by a pasha.—A written permission to trade is called in India a firman.

FIRMINY, *fēr-mē-nē':* town of France, dept of Loire, six m. s.w. from St. Etienne, with which it is connected

by a branch railway. Near it are rich coal-mines. It is a place of much activity, and has manufactures of silk, glass, and hardwares. Ribbons and nails are among the articles most largely produced. Much lamp-black also is made. Pop. (1881) 12,182; (1891) 14,502.

FIRN, n. *fėrn* [Swiss]: name for the slightly compacted snow of the higher Alps. See NÉVÉ.

FIROLA, *fĭr'o-lâ:* genus of gasteropodous mollusks, of the order *Heteropoda,* entirely destitute of shell—though there is a small branchial shell in the nearly allied genus *Carinaria;* of a very elongated form, having the mouth at the extremity of a proboscis; tentacula wanting, or merely rudimentary; and generally remarkable for great transparency of substance, often enlivened with golden spots. They swim by means of the *foot,* which is compressed into a fin, are often seen at the surface of the water in calm weather, and are abundant in the warmer temperature and tropical seas. The oxygenation of the blood is supposed to take place in part through the delicate tissues, as there are no special breathing organs but a ciliated band.

FIROZPUR: see FEROZE PORE.

FIRST, a. *fėrst* [Icel. *fyri,* before; *fyrstr,* in front of all; L. *primus,* first]: earliest in time; foremost; chief; principal; primary; the ordinal of *one:* AD. before anything else. FIRST'LING, n. the first-born of beasts; in *OE.,* a thing first thought of or done. FIRST'LY, ad. *-lĭ.* FIRST-RATE, of highest excellence; of the greatest size, as a man-of-war. FIRST FLOOR, in the *United States,* the ground-floor; in *England,* that next above the ground-floor. FIRST-FRUITS, the earliest mature fruits or produce of the earth; the first profits; first or earliest effects or results, used in a good or bad sense. AT FIRST, at the beginning. FIRST-HAND, directly; immediately; new, as opposed to second-hand. FIRST INTENTION, the healing up of a cut or wound without suppuration. FIRST AND LAST, throughout; on an average. FIRST OR LAST, at one time or other. FIRST-FIT, n. *fĭt,* or FIRST FOOT [Scot. *fit,* foot, person]: in *Scot.,* the person who first enters a dwelling from without on the first day of the year.—SYN. of 'first, a.': original; primitive; primæval; pristine; highest; primordial; earliest.

FIRST-BORN [Heb. *Bekor,* Gr. *prototokos,* Lat. *primgenitus*]: in scriptural use, the first male offspring, whether of man or of animals. By a principle of the Mosaic law, indeed of the common law of nature, it was established that the firstlings of all the produce of creatures, whether animate or inanimate, were in some sense due to the Creator as a recognition of His supreme dominion: see FIRST-FRUITS. Under the title arising from this recognition are to be classed many observances regarding the first-born of animate beings rational or irrational, which prevailed among eastern nations generally, or which are specially established by the Mosaic law.—1. The first-born male, whether of men or of animals, was devoted from the time of birth to God. In the case of first-born

male children, the law required that, within one month after birth, they should be redeemed by an offering not exceeding in value five shekels of silver (Ex. xiii. 13). If the child died before the expiration of 30 days, the obligation of redemption ceased; but if that term were completed, the obligation was not extinguished by the subsequent death of the infant. This redemption took place according to a fixed ceremonial. The first-born male of animals also, clean or unclean, was equally regarded as devoted to God. The first-born of clean animals, if free from blemish, was to be delivered to the priests within 12 months after birth, to be sacrificed to the Lord (Deut. xv. 21); nor was it permitted to any but the priests to partake of the flesh of such victims (Num. xviii. 18). If the animal were blemished, it was not to be sacrificed, but to be eaten at home (Deut. xv. 22). The first-born of unclean animals, not being a fit subject for sacrifice, was either to be put to death, or to be redeemed with the addition of one-fifth of its value (Lev. xxvii. 27; Num. xviii. 15). If not redeemed, it was to be sold, and the price given to the priests.—2. Primogeniture, both by the patriarchal and by the Mosaic law, had certain privileges attached to it, the chief of which were the headship of the family, and a double portion of the inheritance. Before the time of Moses, however, it was in the power of the father to decide which among all his sons should be considered the first-born. Moses ordained that the right should invariably belong to the first-born in point of time.

Among other nations considerable variety existed as to the succession of children to the inheritance of their parent. The Greeks, especially the Athenians, excluded the females of the family so rigorously from the inheritance, that in the event of a father dying intestate and without heirs-male of his body, the nearest male kinsman succeeded to the estate. The later Romans, on the contrary, placed daughters on the same footing with sons as to the division of intestate property. The Mohammedans gave the daughters a certain share of the father's estate, but only one-half of that assigned to the sons. All the nations of Germanic descent restricted the succession, especially in land, to heirs-male. But the Visigoths in Spain admitted females, except in certain contingencies.

For the rights of the first-born in English and Scotch law, see SUCCESSION: PRIMOGENITURE: etc. In France, the law of primogeniture fell at the Revolution, in common with many other relics of the feudal system. How far the results of the change have been beneficial, is still a question among political economists. In Virginia, after the revolution, a similar change took place; and that the change has been in accordance with public opinion in that state may be inferred from the fact, that a parent now usually makes, by will, the same disposition of his property as that which would be provided by the law itself in the case of his dying intestate.

FIRST-FRUITS.

FIRST-FRUITS [Heb. *reshith*, Gr. *protogennemata* and *aparchai*, Lat. *primitiæ*]: that portion of the fruits of the earth and other natural produce, which, by the usage of the Jews and other ancient nations, was offered to God, as an acknowledgment of His supreme dominion and a thanksgiving for His bounty. Among the Jews, the institution of first-fruits comprised both public and private offerings. Of the former class, there were three principal offerings: the first was at the opening of the grain harvest. On the day after the Passover Sabbath, 16th of the month Nisan, a sheaf of new grain, cut and gathered with much solemnity, was carried to the Holy Place, and there waved before the altar (Lev. xxiii. 5, and foll.); nor was it permitted to commence the harvest-work till after this solemn acknowledgment of the gift of fruitfulness. Again, at the Feast of Pentecost, two loaves of leaven bread, made from the flour of the new harvest, were waved, with a similar form of worship, before the altar (Ex. xxxiv. 22). Thirdly, at the Feast of Tabernacles, in the 7th month, was held the great feast of the gathered-in harvest, the final acknowledgment of the bounty of God in the fruits of the year (xxiii. 16).—Besides these public offerings of first-fruits on the part of the entire people, individual Jews were bound to private offerings, each on his own behalf. 1. A cake of the first dough of the year was to be offered to the Lord (Num. xv. 21). 2. The 'first of all the fruits' were to be placed in a basket, and carried to the appointed place, where the basket was to be offered with a prescribed form of words, commemorative of the sojourn of Israel in Egypt, and of his deliverance by the strong hand (Deut. xxvi. 2 and foll.). All these offerings were divided into two classes—the first, called *Bicurim*, comprised the various kinds of raw produce, of which, though the law seems to contemplate all fruits, seven sorts only were considered by the Jewish doctors to fall under the obligation of first-fruit offering—viz., wheat, barley, grapes, figs, pomegranates, olives, and dates. The law lays down no rule as to the quantity of the first-fruit offering; and many questions regarding it have been raised by the commentators. It was customary for the offerers to make their oblations in companies of 24, and with a singularly striking and effective ceremonial.

The second class of first-fruit offerings, called *Terumoth*, comprised the produce of the year in the various forms in which it is prepared for human use, as wine, wool, bread, oil, date-honey, dried onions, and cucumbers.—Under the kings, and again after the captivity, much laxity crept into the observance of this practice, which Nehemiah labored to revive in its primitive exactness. Offerings analogous to the Jewish first-fruits became usual very early in the Christian Church, as is clear from a passage in Irenæus (*Adv. Hær.* b. iv. c. 17 and 34); but the extent to which the practice prevailed, and the amount and general character of the oblation, are uncertain. It appears to have been merged in the legal provision established by the emperors.

The mediæval ecclesiastical impost known under the name of *primitiæ*, or first-fruits, and sometimes of *annates* or *annalia*, was entirely different. By the word in its mediæval and modern sense is meant a tax imposed by the popes on persons presented directly by the pope to those benefices which, by the canonical rules, or in virtue of privileges claimed by them, fall within the papal patronage. Persons so presented were required to contribute to the Roman see the first-fruits (that is, the income of the first year) of their benefice. During the residence of the popes at Avignon, when the papal necessities compelled the use of every means for eking out a precarious revenue, the impost was sought to be extended to every benefice; and this claim was the subject of many contests, especially in Germany and in England, where the claim, so far as regarded direct papal presentation, had existed from the reign of King John. Henry VIII., by two successive statutes, withdrew the right of first-fruits from the pope, in order to transfer it to the king; and he established a special court for the administration of first-fruits, which, however, was soon disused. In the reign of Anne, the revenues arising from this impost in England were vested in a Board, to be applied for supplementing the incomes of small benefices. A similar change was introduced in Ireland by the 2 Geo. I. c. 15; but in the latter kingdom the payment was entirely abolished by the 3 and 4 Will. IV. c. 27. In France, this tax was abolished by the 'Pragmatic Sanction' enacted at Bourges 1438, and subsequently by the *Concordat* of Leo X. with Francis I., 1512. In Spain, it ceased partially in the reign of Ferdinand and Isabella, and finally under Charles V. In Germany, it formed one of the first among the *Centrum Gravamina* presented to the emperor 1521, and the claim ceased altogether from that period.

FIRTH, n. *fėrth*, often spelled FRITH, n. *frĭth* [Icel. *fjördr;* Dan. *fjord*, an arm of the sea; Gael. *frith*, small, little: L. *frĕtum*, a narrow sea]: the mouth of a river widening into an arm of the sea; any narrow passage of the sea; a strait. *Note.*—Skeat says FRITH is connected with L. *portus*, a haven, Gr. *porthmos*, a ferry, and not with L. *fretum*, and that the original sense was 'ferry.'

FISCAL, a. *fĭsk'ăl* [OF. *fiscal*—from OF. *fisque*, the public purse—from L. *fiscus*, a basket of rushes, a great money-bag: It. *fisco*]: pertaining to the public treasury or revenue: N. revenue; exchequer; in *Scot.*, a public officer who prosecutes in certain criminal cases, usually called the *procurator-fiscal.* FISCAL LANDS, lands, among the Franks, set apart for the use of the sovereign, to support his dignity, and to give him the means of rewarding merit or valor. FISCAL YEAR, the financial year of a government. In the United States, for all money accounts, appropriations, etc., the year begins July 1, and ends June 30 following; except that for the accounts of the sec. of the senate, for compensation and traveling expenses of senators, the fiscal year extends to and includes July 3.

FISCHART, *fĭsh'ârt,* JOHN: b. prob. abt. 1545, either at Mainz or at Strasburg; d. prob. abt. 1590. Regarding his life little is known. He was by profession a jurist, but his writings show immense learning and reading in all departments of human knowledge. About 1570, he made a journey to England. Toward 1580, he was living at Strasburg in close friendship with the eminent book-printer, Bernhard Jobin. During 1581–2, he was advocate to the Imperial Chamber at Speier, and, 1585, became bailiff of Forbach, where probably he died. The original editions of almost all Fischart's works are extremely rare, but new ones have recently been published. His most celebrated works are based on foreign models, particularly Rabelais, but there is no servile imitation: a free creative genius works plastically on the materials. To this class belong *Aller Praktik Grossmutter* (1573), *Affentheurlich Naupengehörliche Geschichtklitterung von U. S. W.* (1575), *Podagrammisch Trostbüchlein* (1577), *Binenkorb des Heyl. Römischen Imenschwarms* (1579), and *Der Heilig Brotkorb* (1580). These writings are wholly satirical. With the most inexhaustible humor, he lashes, now the corruptions of the clergy, now the astrological fancies, the dull pedantry, or other follies, public and private, of the time. Next to these stands the outrageously comic work of Fischart's—quite original in its conception—entitled *Flöhatz, Weibertratz* (1574). Essentially different in its homely and simple tone is his *Das glückhafft Schiff von Zürich,* in verse, published 1576 (new ed. by Halling, 1829). Similar in point of style are *Psalmen und Geistliche Lieder* (1576; new ed. Berlin 1849). The rest of Fischart's numerous writings, partly in prose, partly in verse, are of unequal merit, singularly varied in style and contents; the prose works being in general more complete than the poetic. What gives so high a value to Fischart's satirical humor is the warm and genuine feeling which he exhibits for the moral foundations of all public and private life—viz., religion, 'fatherland,' and the family, a feeling which reveals itself in his wildest mirth. His works are, moreover, one of the richest sources whence to draw information with regard to the manners of his time. But perhaps the most extraordinary thing about Fischart is his treatment of the language. No German author can be compared with him, not even Jean Paul Richter himself. He coins new words and turns of expression without any regard to analogy, but nevertheless shows the greatest fancy, wit, and erudition in his most arbitrary formations. The fullest collection of his writings is in the Royal Library at Berlin. For a critical account of the investigations concerning Fischart and his works, see Vilmar in Ersch and Gruber's *Encyclopædic* (s. 1, vol. 5).

FISETIN, n. *fĭz'ĕ-tĭn:* in *chem.,* the yellow coloring-matter of Fiset-wood (see FUSTIC), a species of sumach, *Rhus cotinus.* Fisetin crystallizes in needles which have the formula, $C_{15}H_{10}O_6$.

FISH, n. *fĭsh* [Goth. *fisks;* Icel. *fiskr;* Ger. *fisch;* Dut. *visch;* L. *piscis;* W. *pysg,* a fish]: an animal which inhabits the water, and breathes through gills; the flesh of a fish (see FISHES): a machine to hoist up the flukes of the anchor (but see FISH next below): V. to seek to catch fish; to be employed in catching fish; to seek to obtain by artifice; to search by raking; to draw out or up. FISH'ING, imp.: ADJ. used or employed in fishing (see below): N. the art or practice of catching fish. FISHED, pp. *fĭsht.* FISHY, a. *fĭsh'ĭ,* or FISH'LIKE, having the qualities of a fish. FISH'Y, a. in *familiar slang,* suspicious; rank; foul; not to be meddled with without due inquiry. FISH'INESS, n. state of being fishy. FISHMON'GER, n. *-mŭng'gėr,* one who deals in fish. FISH'ER, n. one who fishes. FISH'ERMAN, n. one whose occupation is to catch fish. FISHERMAN'S RING, seal ring used by the popes of Rome since the 13th c. as a stamp for certain documents—the seal giving the figure of apostle Peter fishing. FISHERY, n. *fĭsh'ėr-ĭ,* a fishing-ground; the trade of fishing (see below). FISHIFY, v. *fĭsh'ĭ-fī* [L *făcĭō,* I make]: *familiarly,* to change or turn into fish. FISH'IFYING, imp. FISH'IFIED, pp. *-fīd.* FISH CULTURE: see PISCICULTURE. FISH-FAG, woman who sells fish; a fishwife. FISHWOMAN, or FISHWIFE, n. a woman who retails fish. FISH-PLATES, plates of iron which are bolted through to connect firmly the ends of the rails on the permanent way of a railway (see FISH next below). FISH-POND, a small inclosed piece of water for breeding fish (see PISCICULTURE). FISH-SPEAR, a spear for taking fish. FISH STORY, an untrue and exaggerated tale. FISH-TAIL, shaped like a fish's tail. FISHERMAN'S BEND, sailor's knot used in bending halyards to a studding-sail yard. NEITHER FISH NOR FLESH, neither one thing nor another.

FISH, n. *fĭsh* [F. *ficher,* to fix or drive in, as a nail; *fiche,* a gardener's dibble]: a counter or marker at cards; a piece of wood secured to another to strengthen it.—In *naval affairs,* THE FISH, apparatus of pulleys employed in dragging the flukes of the anchor toward the bow after it has been hoisted to the cat-head. FISH-FRONT, or PAUNCH, long piece of oak, or fir, convex without, concave within, securely fastened on the injured portion of a sprung mast or yard, to which it imparts rigidity. SIDE-FISHES are long pieces of timber dove-tailed on the opposite sides of a made mast, to give it a circular form and the requisite diameter. *Note.*—Perhaps *fish-plates* in preceding entry is connected with F. *ficher.*

FISH, HAMILTON, LL.D.: 1808, Aug. 3—1893, Sep. 7: statesman; son of Nicholas Fish. He graduated at Columbia College 1828, was admitted to the bar 1830, and entered political life as a whig 1834. He was a member of the state legislature 1837, in congress 1843–45, lieut.-gov. of N. Y. 1847–49, gov. 1849–51, U. S. senator 1851–57, commissioner with Bp. Ames (Meth. Episc.) to visit Union soldiers in Confederate prisons (and negotiated a

general exchange of prisoners) 1862, and U. S. sec. of state 1869, Mar.—1877, Mar. He united with the republican party on its formation, and while U. S. senator opposed the repeal of the Mo. Compromise. He was credited with having suggested the Joint High Commission for the settlement of difficulties between the United States and Great Britain growing out of the American civil war, and was one of the U. S. commissioners who negotiated the Treaty of Washington, 1871. He also settled the long-pending dispute with Great Britain concerning the n.w. boundary of the United States, and the complications with Spain over the *Virginius* outrages in Cuba. Gov. Fish was pres. of the N. Y. Hist. Soc., and pres.gen. of the Soc. of the Cincinnati.

FISH, Nicholas: 1758, Aug. 28—1833, June 20; b. New York: soldier. He entered the College of N. J. 1774, but soon left, and began studying law with Gen. John M. Scott. Early in 1776, he became aide-de-camp to Gen. Scott, and served through the revolutionary war, attaining the rank of lieut.-col. at its close, and taking part in the two battles at Saratoga, the battle at Monmouth, Sullivan's expedition against the Indians, and the operations at Yorktown. After the war he became adj.-gen. of N. Y., supervisor of the U. S. revenue, and pres. of the N. Y. Soc. of the Cincinnati. He was an active promoter of several of the religious and benevolent institutions of the city and state.

FISHBURN, *fĭsh'bėrn*, William: 1760–1819, Nov. 3: soldier. He served on the staff of Gen. Anthony Wayne at the storming of Stony Point, became a maj.gen. in the revolutionary army, settled in S. C. after the war, was a member of the convention which framed the constitution of that state, served in the legislature, and died in Walterborough.

FISHER, Fort, Attacks on, and Capture of: 1864, Dec. 24, 25; 1865, Jan. 13–16. Fort Fisher was a strong earthwork with a land front 480 yds. long, and a sea front 1,300 yds. long, erected on the peninsula between Cape Fear River and the Atlantic Ocean, to protect the harbor and city of Wilmington, N. C., the only remaining Confederate seaport of importance at the close of 1864. An expedition was organized for the capture of the stronghold early in Dec., the naval squadron being under command of Rear-Admiral Porter, and the troops of the land force under Gens. Butler and Weitzel. The combined forces reached Federal Point, less than 2 m. s.w. of the fort, Dec. 15; and shortly after midnight on the 24th, a powder-ship containing 215 tons of powder was towed to within 200 yards of the shore and 1,000 yds. of the fort, and exploded. The experiment on which great hopes of material injury to the fort had been based, proved wholly fruitless, and about noon the fleet opened fire on the fort, and silenced its guns in less than two hours. At daybreak, the 25th, Porter renewed the bombardment, and under its cover the

troops landed, and approached to within 150 yds. of the fort, when Gens. Butler and Weitzel agreed that a successful assault with the force at their command was impossible. The troops were then withdrawn and sent back to the James river, while the fleet retained its position. Gen. Grant determined to renew the attack, and collected a new force of 8,000 men under Gen. Terry at Bermuda Hundred, 1865, Jan. 2, 3. Gen. Terry disembarked at Federal Point under cover of a heavy fire from the fleet, Jan. 13th, erected breastworks from the river to the sea; and, Porter having kept up his bombardment through the nights of the 13th and 14th, Terry landed and placed his artillery early on the 15th, and began the assault with soldiers and sailors at 3:25 P.M. At 4 o'clock one-half the fort had been carried, and at 9 the whole was occupied. The Confederate loss was 217 killed and wounded, 2,083 prisoners, 169 pieces of heavy artillery and many small arms, and the Union loss, 110 killed, 536 wounded. The assault and defense were conducted with great skill and stubbornness from beginning to end.

FISHER, *fĭs'hẽr*, GEORGE PARK, D.D., LL.D.: theologian: b. Wrentham, Mass., 1827, Aug. 10. He graduated at Brown Univ. 1847, and Andover Theol. Seminary 1851; after studying theol. in Yale Divinity School, 1848–9, continued his studies in Germany, 1852–54, and was appointed prof. of divinity in Yale Univ. and ordained pastor of the Yale University Church, 1854, Oct. He held this office of prof. till 1861, when he was transferred to the chair of ecclesiastical history. Besides contributions to the *New Englander*, of which he became an editor 1866, *North American Review*, *British Quarterly*, *Bibliotheca Sacra*, and *Princeton Review*, he has published *Essay on the Supernatural Origin of Christianity* (1865, 77); *Life of Benjamin Silliman*, 2 vols. (1866, 77); *The Reformation* (1873); *The Beginnings of Christianity* (1877); *Faith and Rationalism* (1879); *Discussions in History and Theology* (1880); *The Christian Religion* (1882); *Grounds of Theistic and Christian Belief* (1883); and *Outlines of Universal History* (1885). He received the degree D.D. from Brown Univ. 1866, and Edinburgh Univ. 1886, and LL.D. from the College of N. J. 1879. His writings are characterized by profound learning, cogent thought, a broad Christian spirit, and a lucid and attractive style.

FISHER, *fĭs'hẽr*, JOHN, Bishop of Rochester: 1459 (or 61, or 65)—1535, June 22; b. Beverley, in Yorkshire, England. He was educated at Michael House College (now incorporated with Trinity College), Cambridge, where he took his degree 1491, and of which he became master 1495. Margaret, Countess of Richmond, mother of Henry VII., charmed by the report of his virtues and learning, next appointed him her chaplain and confessor. In 1501, he was elected chancellor of the univ.; and in 1502, became the first Margaret prof. of divinity. Two years later, he obtained the bishopric of Rochester. For many years after this appointment, he labored diligently for the welfare of

the church and the universities. The Reformation of Luther found in him—as might have been expected from his devout ecclesiasticism—a strenuous, if not an able opponent. In 1527, a rupture took place between him and Henry VIII., in regard to the divorce of Queen Catharine. Fisher refused to declare the marriage unlawful. From this period, he figures in the politico-religious strifes of his time as a stanch adherent of the papacy, and the leading opponent of the king's innovations. He opposed the suppression of the lesser monasteries 1529, and the acknowledgment of Henry as head of the church 1531, and thereby excited the dislike of the party of progress in the English nation. His credulity—many would apply a harsher term—in reference to Elizabeth Barton (q.v.), the 'Holy Maid of Kent,' involved him in a still more perilous antagonism to the king. He was imprisoned; and on refusing to take the oath affirming the legality of Henry's marriage with Anne Boleyn, he was committed to the Tower, 1534, Apr. 26, where he was treated with great barbarity. A kind but inconsiderate act of Pope Paul III. now hastened the destruction of the old man. His Holiness, as a reward of his faithfulness, sent him a cardinal's hat, 1535, May. When Henry was informed of this, he exclaimed: 'Mother of God, he shall wear it on his shoulders, then; for I will leave him never a head to set it on.' His ruin was now certain. He was accused of high treason, and after a brief trial, was condemned, and sentence of death was executed. Fisher was one of those unfortunate persons who, with abundance of personal virtues, find themselves opposed to the overwhelming tendencies of the times in which they live.

FISHER, Sydney George, American lawyer and historical writer: b. Philadelphia, Pa., 1856, Sept. 11. He was graduated at Trinity College 1879, studying law at Harvard, and being admitted to the bar 1883. His works include: *The Evolution of the Constitution* (1887); *The Making of Pennsylvania* (1896); *Pennsylvania: Colony and Commonwealth* (1897); *Men, Women, and Manners in Colonial Times* (1898); *The True Benjamin Franklin* (1899); *The True William Penn* (1900); *The True Story of the Revolutionary War* (1902), etc. He also wrote a notable article in *The Forum*, 1894, January, entitled *Has Immigration Dried up our Literature?* and many magazine articles advocating the establishment of civil service reforms.

FISHER'S HILL, Battle of: 1864, Sept. 24. Upon the defeat of Gen. Early at Winchester or Opequon, Sept. 19, 1864, he retreated 20 miles up the Shenandoah Valley, halting at Fisher's Hill, two miles south of Strasburg, a position that had been strongly fortified. Gen. Sheridan followed Early, and on the 22nd about 4 p. m. attacked and soon routed him, pursuing during the night as far as Woodstock, 12 miles from the field of battle, taking 16 guns and over 900 prisoners. The Union loss was 509 killed and wounded. Early reported a loss of 240 killed and wounded, and 995 missing.

FISHERY: capture of various kinds of fish for the purpose of trade. In many countries, and especially in the United States, Great Britain, and Ireland this pursuit affords remunerative employment to a large proportion of the population, and forms an unequalled nursery for sailors to recruit the navy.

In remote ages, fish were caught in the rudest manner by men who lay on the rocks, ready to shoot them with arrows, or transfix them with spears. Even yet, in regions only partly civilized, fish are taken with blankets or sheepskins; and a roughly made spear, known as a leister, is still used in the country districts of Britain in the illegal capture of salmon. Advancing intelligence, however, and the use of fish as an article of barter for other kinds of food, soon led to more effective modes of capture. Dwellers on the sea-coast began to exchange fish for animal food killed by inland hunters, and in this way initiated a commerce now represented by vast capital and enterprise. The importance of fisheries, as bearing on the food-supplies of nations, inland as well as maritime. and as a remunerative outlet for labor, can scarcely be overestimated, especially as fish has been in use for human food from the most remote periods. Previous to the Reformation, it was in universal demand in Britain, being the prescribed diet during the fasts appointed by the church. One great peculiarity of this source of wealth is that, with slight exceptions, the sea-harvest (if we may so call it) is ripened without trouble or expense for the fisher, who requires only to provide the means of gathering it; and that, under certain regulations, it is free to all comers. River fisheries, except for salmon, are unproductive in Great Britain; and Lochlevan is the only British fresh-water lake the produce of which is marketable.

The principal fisheries of Great Britain include the capture of salmon, herring, cod, soles, turbot, mackerel, lobsters, oysters, etc. Immense quantities of these are in constant demand: the various lines of railway that branch inland from the coast afford rapid transit, and have in consequence considerably enhanced the value of sea-produce, much of which was at one time useless for want of sufficiently rapid conveyance to those seats of population where it would have found ready sale. It is affirmed, indeed, by those who have studied the subject, that increased demands have affected the fisheries and rendered them less productive than formerly. The machinery of capture is being extended every year, and the supplies have now to be brought from greater distances, the shoals frequenting the coast lines being much exhausted by the incessant inroads made upon them by fishermen. It is difficult to obtain reliable statistics of the different British fisheries. Excepting the govt. board for Scotland, there is no recognized authority on the subject. The following figures, bearing on the herring-fisheries of Scotland, the most important fisheries of the United Kingdom, are taken from official returns by the commissioners, annually laid before parliament. They represent only the quantity of herrings which is 'cured,'

but immense numbers of that fish are sold fresh, as taken from the sea. The Scottish-cured herrings are sold not only in Great Britain, but in her colonies and foreign countries. At Hamburg and other continental seaports, there are merchants who deal largely in cured herrings, and employ agents who annually visit the various British ports to purchase supplies. It is for the satisfaction of these foreign buyers that the 'brand' is used; it denotes the quality of the herrings, and prevents one class of herrings being sold for another class that may be inferior. The principal seats of the herring-fishery in Great Britain are at Wick, in Caithness-shire, Scotland, and at Yarmouth, in England; but the industry is carried on at many other places on the British sea-board and on the coast of Ireland, which is 2,500 miles in extent.

A visit to Billingsgate, the great fish-market of London, gives some idea of the food-wealth of the sea, many tons of all kinds of fish being daily distributed from that mart. The average quantities of white fish estimated to pass through Billingsgate in a year are as follows: Haddocks, 3,500,000; whitings, 20,000,000; soles, 100,000,000; cod, 950,000; plaice, 35,500,000; mackerel, 35,000,000. This estimate is only at the best a very rough one, as there are no arrangements for gathering such statistics. So great is the demand for white fish throughout the kingdom, that many fishermen sail north to the Orkney Islands to obtain them. Most of the cod-smacks carry their cargo alive as far as Gravesend; but they dare not venture farther up the Thames, as the fish would not live in its foul waters. The Irish seas are famed for the fine quality of their white fish; the haddocks of Dublin, in particular, have great reputation, but during late years they have become very scarce. In Scotland, a vast proportion of the haddocks are slightly smoked, and sold as 'Finnans', a well-known breakfast delicacy. Large quantities of cod and ling are caught, split up, and sold in a dried state. The most valuable white fish, individually considered, is the aldermanic turbot, which brings a high price. The supply of turbot is derived chiefly from Holland, the fishermen of that country making the capture of the turbot and the sole a *spécialité*. Eels also are caught in large quantities at all seasons, and fetch a remunerative price in the London fish-markets. As many as 16,285 boxes of eels are annually sent from Ireland to England. These boxes each contain on an average 40 lb. weight, and the price at 6d. per lb. would give in £ sterling a value equal to the number of boxes. In Scotland, where a prejudice has long existed against eels, the eel fisheries are beginning to prove remunerative.

The lobster, being by far the most valuable of the crustacean kind, is most assiduously nursed in ponds, so as always to be ready for market. Near Southampton, a thousand or two are kept always on hand, and steam-vessels are employed to bring them alive from the most distant parts of the coast: these boats are built exclusively for

SEINING FOR SALMON ON THE COLUMBIA RIVER.
1. Loading the Boats. 2. Drawing the Net.

this purpose, and have immense wells in them to hold the living freight. The lobsters are not at once brought to London, but are kept ready in perforated boxes, in various parts of the Thames, to answer the demand as it arises. Norway supplies at least two-thirds of the lobsters used in Britain, the daily consumption being estimated at 60,000. The lobsters taken from the British seas have to be sought at greater distances from the shore than formerly—those obtained on the immediate coast being now very small, technically called 'half lobsters.' There is an enormous demand for oysters, also, and a considerable proportion of the maritime population earn a comfortable livelihood by breeding and dredging them. At Whitstable, Kent, and at various places in Essex, there are dépôts for sorting and storing oysters. The 'spat' is procured and grown in the course of four years into a marketable commodity of much value, the wholesale prices for the various kinds having been doubled between 1860-73. The oyster used to be found in great abundance on the British coasts, but some of the natural beds have been so largely drawn upon that they are becoming exhausted The natural oysters of Ireland are now very nearly dredged up. In America, the oyster is a common mollusk, and notwithstanding a constantly increasing demand, the natural beds are still productive. See OYSTER.

While sea-fisheries are open to all who have the means of working them, salmon-rivers are for the most part private property. The owners of particular streams usually form themselves into an association chiefly for the protection of the fish during the spawning season. The usual method is for the 'lairds' to let their fishings to tenants, who are called 'tacksmen,' and whose interest it is to capture and sell all the fish they can find. The rents obtained, are in some instances, very large. Before the invention of packing in ice, and the introduction of steam boats and railways, salmon was hawked through the country towns by cadgers at an almost nominal price, while it was sometimes sold in the public markets at twopence per pound. When the increased demand created by these facilities of conveyance, caused it to attain its present price, tacksmen were tempted to overfish their streams, and the consequence was the comparative exhaustion of particular rivers; but by protective acts of parliament, the salmon-fisheries are now proving very remunerative both to lessees and lairds, the fish having again become comparatively plentiful and of larger size.

The food-fisheries of France have recently become very extensive, especially in the capture of sea-fish and crustaceans. A very large number of sardines are annually caught and cured in the French seas, the cure of this little fish being a very remunerative industry at Concarneau and other places. In the cultivation of those less important fishes which thrive best in lakes, canals, and rivers, the French excel, for while in other countries these are cultivated only for amusement (see ANGLING), the French people

make them an article of commerce, and derive considerable money from their sale. At one time, the whole fresh-water fisheries belonging to France were not of so much value as one of the Scottish salmon streams; but by artificial cultivation and careful nursing, they have been much increased in value, and, by the care of the government, are being yearly improved. The fresh-water fisheries of France are of great extent, some of the fishponds in that country covering more than 30,000 acres. These fisheries all are more or less under control of the government. In Paris, the annual consumption of fish has been estimated to give for each individual 30 lbs. of sea-fish, and 1 lb. of fresh-water fish.

Among other national fisheries most worthy of notice are the river-fisheries of Germany, where there is assiduous culture of the Danube salmon and other fresh-water fish. In the Mediterranean, various kinds of fish are taken, the one of greatest value being the tunny. The anchovy and sardine also are taken in large quantities. For an account of the great eel-fishery at the mouth of the Po, on the Adriatic, see COMACCHIO. The Dutch are at present as industrious upon the sea as they were at the time when they founded Amsterdam, and a large proportion of the population of Holland are engaged in fisheries, which are still a source of wealth. The herring, though not taken by the Dutch in such large quantities as formerly, is as carefully cured as ever, Dutch-cured herrings having a great reputation. Excellent salmon are taken in the mouths of the Rhine, and many are sent to London for sale, as they can be supplied when British salmon cannot. The Norwegian fisheries afford large quantities of lobsters and turbots, while from Newfoundland is derived a plentiful supply of cod or ling. The Newfoundland fisheries, principally for cod, have existed for more than three centuries. Sir Francis Drake was the first person who fished there on behalf of England, and the fish he sent home soon excited a spirit of enterprise in the country, which led to the dispatch of a large number of ships and the extension of the fishery. The island is surrounded by the cod-banks, and the capture and cure of this fish are the staple occupation of the people. In America, immense quantities of shad are bred artificially to aid the natural supplies; the 'pisciculture' of salmon has also been commenced on a large scale, that fish having become scarce near the seats of great population. See NEWFOUNDLAND.

The oil-fisheries are not so important as they were, the invention of gas and the discovery of other lubricants having provided substitutes for whale oil. The success also of the whale-fisheries has fluctuated so much as to prevent modern capitalists from embarking very largely in the trade. The only novelties that distinguish the whale-fishery of the present day are the introduction of steam-whalers, and, in some instances, of vessels wintering in Greenland; but, with all these advantages, British whalers

barely pay their expenses, and the fishery as compared with former years, shows considerable falling off. The total British whaling fleet numbered at one time 159 ships but today it barely amounts to a tenth of that number. The seal is now largely captured for its oil, many thousands being annually killed by British sealers—as many as 15,000 being taken by the men of a single ship. See WHALE; CACHOLOT; SEAL; GREENLAND; etc. The South-Sea or sperm-whale fishery is principally in the hands of the Americans, who pursue it most successfully.

The British and Irish sea and salmon fisheries are, so far, regulated by numerous acts of parliament protecting and promoting them. The sea-fisheries are, in effect, free to all who choose to fish; but the salmon is, by use and wont, as also by acts of parliament at various times, private property, though the owners of fisheries have had to submit them, from time to time, to the regulating power of the legislature.

By a treaty of 1839 between Great Britain and France, the limits within which the general right of fishing in the intervening seas is exclusively reserved to the subjects of the two kingdoms respectively, are fixed at three miles' distance from low-water mark. In 1854, a similar treaty was concluded regulating, *inter alia*, the common rights of fishery between the British colonies in N. America and the United States. The Halifax Fisheries Commission constituted under the treaty of Washington (1871) gave 1877 an award of 5,500,000 dollars to Canada for conceding to Americans the right of fishing in Canadian waters. Fresh fish of British taking, imported in British bottoms, may be landed without report or entry. Persons employed in the fisheries, in such manner and under such circumstances as are laid down in 50 Geo. III. c. 108, are exempted from impressment.

It would be well if the various acts of parliament regulating the fisheries were codified or arranged in some logical sequence; and the various fishery offices might be consolidated under one governing board, instead of being as at present, scattered over various public departments, or administered in separate offices.

FISHERIES OF THE UNITED STATES. According to the report of the U. S. Commission of Fish and Fisheries there were in 1902, about 200,000 persons employed in the commercial fisheries of the U. S. The amount of capital invested was about $60,000,000, and the value of the products to the fisherman was approximately $50,000,000. The different regions in which fisheries exist are the New England, Middle Atlantic, and South Atlantic states on the Atlantic coast, the Gulf states on the Gulf of Mexico, the Pacific coast states, Alaska, the Great Lakes, and the various rivers and minor lakes.

During 1902 the propagation of food fishes was greatly favored by the conditions governing the collection of eggs, and also by increased appropriations. In consequence of these advantages there was an increased out-

put of nearly all the species handled, and in the aggregate there were distributed 1,495,500,000 fish and eggs more than in 1901. Of these 99 per cent. were in the interests of the commercial fisheries, and 1 per cent. or 14,900,000 were game fishes. In the prosecution of its work the commission had 38 stations, situated in different parts of the country, several fish-distributing cars, and several vessels. The largest and best equipped of these stations is that at Woods Hole, Mass. Here in 1901 four vessels were constantly employed and two temporarily. In February arrangements were made to collect the eggs of flat-fish and 553 females were secured, of which 105 died and 123 failed to deposit eggs. The product of the egg-bearing fish amounted to 194,059,000 eggs, more than 700,000 per fish. In April egg-bearing lobsters were collected, and during the season the total number of eggs obtained reached 20,480,000, a slight increase over the previous year. The most important work, however, was that of the collection of brood cod. The total number of cod eggs obtained at Woods Hole, during the latter part of 1901 and the early part of 1902 amounted to 205,683,000, from which 128,810,000 fry were hatched and planted.

FISHERY-TREATIES OF THE UNITED STATES: international arrangements relative to fishery. By international law the sea for a league from shore belongs to the adjacent land, and without rights expressly conceded citizens or subjects of another power can neither fish there, nor dry and cure their fish on the land. The importance of the fishery interests along the coast of the United States and the British provinces, and the large numbers of the population of each engaged in fishing in those waters, have occasioned frequent collisions and mutual embarrassments, which could be allayed only by treaty between the two countries. That of 1783, which recognized the independence of the late colonies, allowed their citizens to fish on the Bank of Newfoundland, in the Gulf of St. Lawrence, and elsewhere, as formerly; and granted liberty to take fish 'on the coasts, bays, and creeks' of the British dominion in general, and to dry and cure them in any unsettled bays, harbors, etc., but otherwise only with the consent of inhabitants or owners of the land. After the war of 1812, the treaty of Ghent, 1815, ignored the subject; the U. S. govt. claimed that the old treaty was still in force, but this Great Britain denied. A convention at London, 1818, granted to fishermen from the U. S. the right to fish on certain parts of the w. and s.w. coast of Newfoundland, on the shores of the Magdalen Islands, and on the coast of Labrador e. and n. of Mt. Toby; to dry and cure fish on Labrador and the s. coast of Newfoundland while unsettled, or otherwise with local consent, as before; and to enter bays or harbors for wood, water, shelter, and the repair of damages. These grants were perpetual, to be merely suspended in case of war. The U. S. govt. renounced the right to take, cure, or dry

fish within three m. of any British coast not mentioned.—The 'Reciprocity Treaty' of 1854 confirmed the rights granted in 1818, and conferred further the rights of taking all fish except shellfish, salmon, and shad, on the coasts, and in the bays, harbors, and creeks (but not in the mouths of rivers) of Canada, New Brunswick, Nova Scotia, Prince Edward I., and the neighboring islands, and of curing and drying fish on all these shores. In return, similar rights were secured to inhabitants of the British dominion, on the U. S. coast as far s. as lat. 36°. The St. Lawrence and Lake Michigan were made free to the navigation of both countries.—The treaty of 1854 was abrogated (according to one of its provisions) 1866, Mar. 17, notice having been given by the U. S. govt. a year previously. This left the treaty of 1818 in force, and the British-American authorities made many complaints of aggressions on the part of fishermen from the states. For five years a state of tension and unpleasantness existed, till the treaty of Washington was negotiated in 1871. By this, most of the provisions of 1854 were revived, but British rights of fishing were limited to lat. 39°. By article 21 free trade was established in fish-oil and sea-fish between the two countries. By article 25 commissioners were authorized to meet at Halifax and determine on the British claim that the United States had been benefited by the concessions to a greater extent than Canada. The commission met in 1877 and awarded $5,500,000 to Great Britain. Article 33 made that part of the treaty which referred to the fisheries (like the treaty of 1854) terminable after ten years on one year's notice by either party. The fishing articles of the treaty of 1871 expired 1885, July 1, but a temporary arrangement was made whereby the privileges accorded American fishermen under those articles were continued during the remainder of that year's fishing season, and after that the industry was again conducted under the provisions of the treaty of 1818. All attempts to arrive at an interpretation, satisfactory to both parties, of Art. I. of the treaty of 1818, were unsuccessful. American fishermen were subjected to numerous vexations, interferences, and annoyances, their vessels were seized upon pretexts regarded in the United States as inadmissible, and they were otherwise treated by Canadian authorities and officials in an oppressive manner. This conduct was justified by Great Britain and Canada by the claim that the treaty of 1818 permitted it, and on the ground that it was necessary to the protection of Canadian interests. In 1886 the U. S. govt. was officially informed that American fishermen would no longer be permitted to ship their fish in bond and free of duty through Canadian territory to the United States, and since then such shipment has been denied. The same year serious difficulties arose over the seizure by the Dominion authorities of vessels from the states engaged in fishing in the waters of British N. America. Retaliatory measures were threatened and in some instances attempted, and public excitement over the situation became widespread and heated. In 1887, May,

the U. S. govt. sought an international conference for the purpose of having Art. I. of the treaty of 1818 so clearly interpreted that there should be no further ground for misunderstanding. As a result the United States and Great Britain each appointed three commissioners, who sat in Washington, formulated a new treaty, and signed it 1888, Feb. 15. On the 21st President Cleveland transmitted to the senate the draft with the *modus vivendi*, and all correspondence relating to the subject. On Aug. 21, the senate rejected the treaty by a vote of 27 ayes to 30 nays, and two days afterward the president sent a special message to congress regretting the action of the senate and asking for further power to institute measures of retaliation upon Canada.

At this point Newfoundland and Canada parted company, so far as their attitude toward the United States was concerned. A *modus vivendi* for two years, to admit of the treaty being adequately considered by the senate, had been arranged between the high contracting parties, granting American fisher-vessels, on payment of a license of $1.50 per ship-ton, the right to enter the non-treaty waters of Canada and Newfoundland to purchase bait, ice, stores, and outfits; to transship cargoes; and to hire men. When the treaty was rejected, Newfoundland saw that fishery reciprocity between the United States and Canada was hopeless, and offered the former an accord on her own behalf. The proposal was accepted in 1890, when Secretary Blaine and Colonial Secretary (subsequently premier) Bond drafted the Bond-Blaine Convention, providing privileges for American fishermen in Newfoundland waters in return for free entry of Newfoundland fish into American markets.

When it was ready for ratification, Canada protested against it, claiming that Newfoundland should not be allowed to make such a compact without including the Dominion; and the British Government, to avert a collision between the greater colony and the smaller, pigeonholed this draft till Canada should have had an opportunity to effect a similar understanding. But this she could not do, though the Conservative and Liberal Cabinets both sought terms from Washington, and as neither Canada nor Newfoundland dared abrogate the *modus vivendi* while hoping for a solution of the deadlock, the temporary arrangement continued year after year. In 1902 Canada withdrew her protest, and Sir Robert Bond revived the moribund draft, with Secretary Hay, the new one being known as the Bond-Hay Treaty, and containing improvements suggested by 12 years of discussion. In 1904 the United States Senate 'amended this to death,' at the instance of the New England fishery interests, and then Newfoundland resolved to cancel the *modus vivendi*. This her Legislature did by an enactment in April, 1905, excluding all American fishing vessels from her non-treaty waters, save for wood, water, shelter or repairs, privileges conceded by the Convention of 1818; and, as regards her

treaty waters, restricting them to the mere rights that compact assured to them. The first effect was to hamper them in securing bait for their deep-sea fishing, for which Newfoundland is the natural base, because of its proximity to these shoals. The second was to partially destroy the winter herring fishery on the West Coast. Here they have treaty rights, but these are not ample enough to enable them to prosecute this industry successfully, as they need large numbers of coastfolk for netting and the use of the strand for salting or freezing the fish, and the residents were forbidden to work for, or sell to them; it being usual for the Americans previously, with the approval of the Colonial Government, to buy whole cargoes from the settlers who caught the fish. The withdrawal of these privileges seriously hampered the Americans and lessened their catch. They would, indeed, have fared even worse but that they succeeded in evading the Colonial Laws by inducing the coastfolk to proceed outside the three-mile limit and hire on board their ships there, returning then into territorial waters and serving as members of their crews.

This claim of the Americans to ship Newfoundlanders outside the three-mile limit and then return with them into port as legally part of their crew has not been confirmed at Washington. The State Department has discountenanced it and instructed the American fishermen that they may only bring into Newfoundland waters crews shipped in American ports.

Newfoundland, early in 1906, passed a further Act making it illegal for any of her people to leave her waters for such a purpose, or for any foreign fishing vessel to enter her waters with such men on board, while the Americans were also required to pay light dues, observe colonial fishery regulations and enter and clear at the custom-houses, which obligations they had declined to subscribe to since the rupture. On one of these questions the claim of the Newfoundland Government to compel all American vessels to enter and clear at the Custom House is unanswerable. All nations have an inherent right to protect their revenues from smuggling. The supply of goods aboard their schooners known as 'the slop chest' is solely for this purpose. Canada has always compelled them to enter and clear their vessels when visiting Dominion ports and Newfoundland claims the same right. The United States Government does not uphold its fishermen on this point. The payment of light dues rests upon the same basis. The most contentious question is, how far are the Americans bound to obey local fishery laws? Where these regulations are general and simply for the protection of the species from destruction, it would seem reasonable that they should be obeyed. One point on which there has been some friction lately is the right of the Americans to fish on Sunday. This irritates the Newfoundlanders more than anything else and caused the trouble years ago known

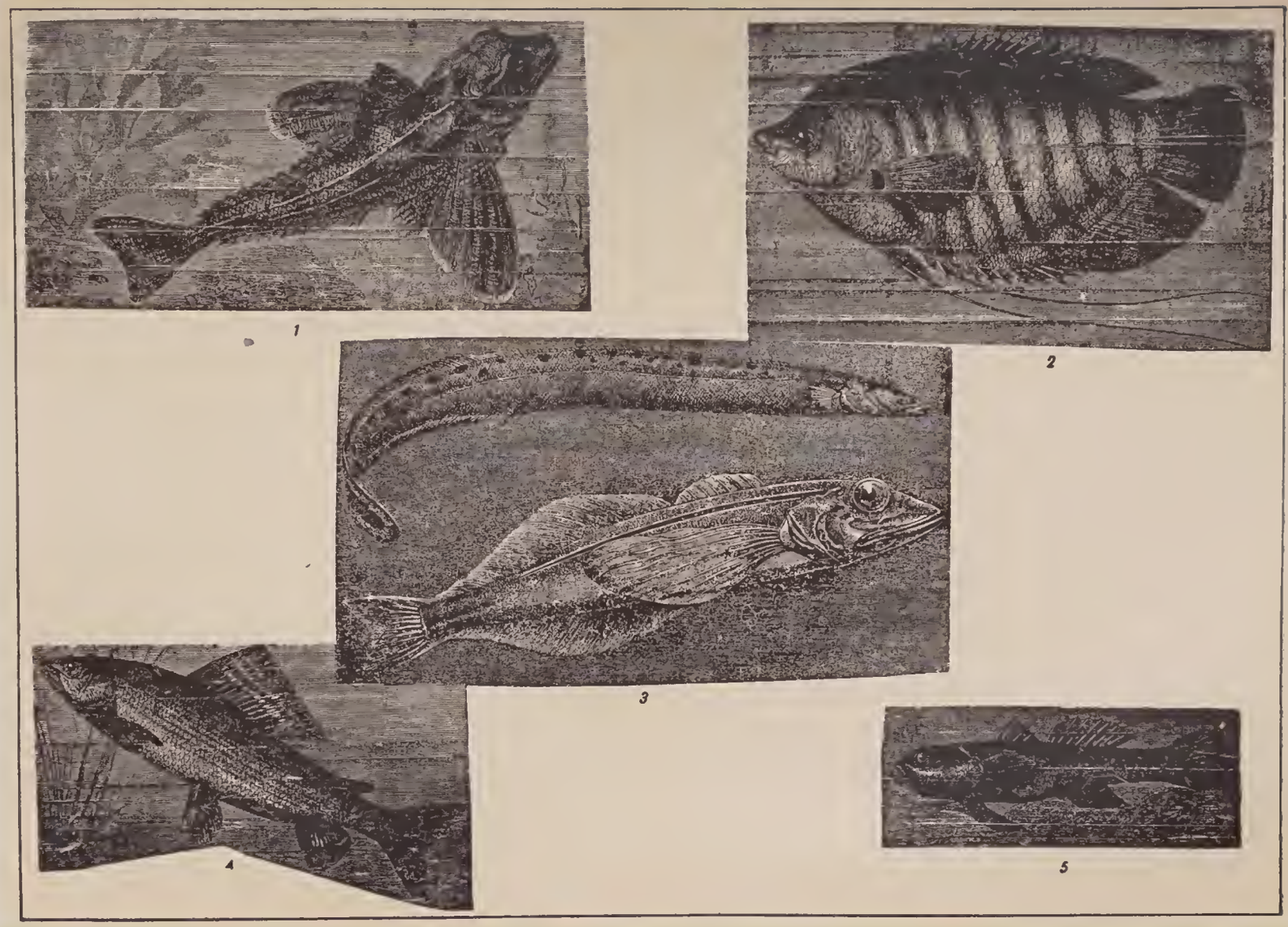
as 'the Fortune Bay Outrage.' As grave international problems are involved in the whole question the British and American Governments opened negotiations for an adjustment of it, and negotiations are now (1906) in progress, and the outcome cannot be foreshadowed, but as the relations between England and the United States are at present most cordial a settlement of all these disputed subjects will in all probability be arrived at.

Canada still continues the *modus vivendi*, apparently unready or unwilling to engage in a struggle such as Newfoundland is waging. There is, however, a growing sentiment among the fishermen of the Maritime Provinces in favor of concerted action with Newfoundland, as they hold that the present policy is hurtful to them, since by denying the Americans these concessions their catch would be lessened and Canada would sell more fish in the United States markets, the domestic supply being inadequate to the demand. Canada, however, punishes as severely as Newfoundland does any infractions of her laws by Americans, and as this provokes recurring irritation in the United States the probability is that there will be a new treaty within the near future covering the whole subject of American fishery relations with both Canada and Newfoundland.

FISH'ES (*Pisces*): the fourth—or, according to Milne-Edwards and some other naturalists (see AMPHIBIA), the fifth—class of vertebrated animals; consisting of creatures which, living in water, breathe by gills (*branchiæ*), and not, at any stage of their existence, by lungs. In number—both of individuals and of different kinds—they are supposed to exceed all other classes of vertebrate animals together. Even the water of hot springs and the pools of caverns have their peculiar fishes, and some of these are known only as thrown out with torrents of muddy water by volcanoes.

The form of fishes is generally adapted to easy and rapid progression through water, being more or less nearly that of a spindle, swelling in the middle, and tapering toward the extremities; the outline unangular, and the surface smooth. But exceptions to this rule are numerous; and some, provided with other means of seeking their food, or of preservation from their enemies, exhibit the greatest departures from the ordinary shape: some are globe-shaped, some have a most irregular and angular outline, many are much elongated, as eels; and others are compressed and flattened, as flounders.

The bones of fishes differ much in their structure from those of other vertebrate animals, they are less dense and compact, and when their ossification is perfect, remain separate, as in the early embryotic state of the *Mammalia*. The bones of the sub-class of Cartilaginous Fishes (q.v.), however, never become properly ossified. The bones of fishes generally contain a smaller proportion of earthy matter than those of other vertebrate animals; and their cartilaginous basis contains no gelatine strictly so called. The



1. Gurnard (*Trigia hirundo*).
2. Gourami (*Osphromenus olfax*).
3. Indian Spring Eel (*Mastacembelus armatus*) above and Golomynka or Oilfish of Lake Baikal (*Comephorus baikalensis*) below.
4. Grayling (*Thymallus thymallus*).
5. European Goby (*Gobius fluviatilis*).

typical character of the vertebrate skeleton is, however, maintained, though modified; and many of the bones—a great majority, for example, of those of the head—are evidently homologous with those of quadrupeds and of man. There is no neck, and the vertebræ are distinguishable only into abdominal and caudal. The vertebræ are concave at each end, and pierced in the middle, the hollow space being occupied with a gelatinous substance. Spinous processes, sometimes short, sometimes long, extend upward and downward from the vertebræ to support the muscles. Fishes generally have ribs, connected with the abdominal vertebræ; and in many, an additional set of small bones (*epipleural spines*) connected with the ribs, and arising from near the base of the ribs, extends outward and backward through the lateral muscles. The four limbs which belong to the typical structure of vertebrate animals, assume in fishes the form of *Fins* (q.v.), and are generally, though not always, all present, the first pair being the *pectoral*, the second pair the *ventral* fins. In some fishes, the ventral fins, answering to the hind feet of quadrupeds, are actually further forward than the pectoral fins, and are

Skeleton of Perch.

then called *jugular* fins. In some, as the common eel, the ventral fins are wanting; in some, as the *Muræna*, there are neither pectoral nor ventral fins. Connected with these fins are bones, which show that they represent the limbs of other vertebrate animals. Fishes have also other fins not so closely connected as these with the internal (*endo-*) skeleton, and not placed like them in pairs toward the sides, but vertically on the middle (*mesial*) line; one or more (*dorsal*) on the back; one or more (*anal*) on the opposite or ventral aspect, behind the anus; and one (*caudal*) at the extremity of the tail. The caudal fin is in general the principal organ of locomotion, and most of the muscles of the body combine to give great energy to its strokes, great part of the body moving with it, and the vertebræ with their processes being so framed as to admit great freedom of lateral, and scarcely any vertical motion. The pectoral and ventral fins seem to serve chiefly for balancing the body, and guiding and staying its motion; the dorsal and anal fins, like the keel of a ship, for keeping it in its proper position. All the vertical fins are supported by bones which do not join those of the internal skeleton, but are thickest at the skin, from which they penetrate toward

the vertebræ, being interposed between the spinous processes of the vertebral column. Several of the last caudal vertebræ are generally very short and combined, and the interposed spines which support the caudal fin converge toward them. The *rays* of fins are either pointed bones (spines)—sometimes prolonged beyond the membrane, and forming defensive weapons—or they are cartilaginous and jointed, in which case they often also branch near their summit. The caudal fin never has any other than these soft rays, and many fishes have no other in any of their fins. A few fishes, belonging to different families, have the pectoral fins developed to an unusual degree, so as to make them capable of supporting short flights in the air (see FLYING FISH; FLYING GURNARD); and a few are capable of employing their fins as organs of locomotion in a very different way, creeping along the ground, or hopping among the weeds and stones of the shore.

The heart of fishes consist only of one auricle and one ventricle, receiving venous blood only, and sending it to the gills, where, being oxygenated, it passes into the greater or systematic circulation by the dorsal vessel. In most fishes there is, close to the heart, a thick *bulb* or muscular swelling of the great artery which conveys the blood from the heart to the gills, and which assists in propelling the blood, being furnished with valves to prevent its regurgitation into the heart; and this bulb and its valves exhibit varieties admirably characteristic of different natural groups, much founded upon in the system of Müller and Owen. The blood of fishes is red; its corpuscles are oval and of considerable size, but in general not very numerous. Fishes consume little oxygen in respiration, and are *cold-blooded* animals, having in general a temperature little elevated above that of the water in which they live; though there are some singular exceptions to this rule, as the tunny, sword-fish, etc., which, having a comparatively high temperature, have also redder blood with more numerous corpuscles. The oxygen appropriated by means of the gills in respiration is obtained not by decomposition of water, but from the air which is mixed in it, hence the necessity of aerating an aquarium; hence also one of the benefits resulting from the agitation of the ocean and of lakes by winds. Some fishes require a greater supply of air than they can easily obtain from the water, and frequently come to the surface to breathe. Fishes taken out of the water die from want of breath, in consequence of the drying up of the fine fringes of the gills; and those which are capable of subsisting longer out of water than others, have generally small gill openings, not so freely admitting the air to dry the gills, while a few are provided with receptacles for water to keep them moist. See ANABASIDÆ.

The gills of fishes are at the back part of the sides of the head, and consist of a multitude of very vascular membranous plates, generally in double fringe-like rows fixed by the base only, and simple, though in a few fishes they

are feathery, and in the greater number of *Cartilaginous Fishes* (q.v.), they are fixed both by their external and their internal edges, or consist of mere folds of membrane attached to the surface of the gill-cavities. In general, there are four gills on each side; the number is greater in some of the Cartilaginous Fishes. In Osseous Fishes, the gill-plates are attached to the external edge of the branchial arches, bony arches connected with the *hyoid bone* or bone of the tongue—which is unusually developed in fishes—and with the base of the skull, the connection at both ends being effected by intervening small bones, and the whole forming a complicated system; while the cavity containing the gills, on each side of the head, is covered by a bony plate, the gill-lid, gill-cover, or *operculum*, with two subordinate pieces, called the *sub-operculum* and *inter-operculum*, articulated on the temporal bone, and playing on the *pre-operculum*, a bony plate placed before them in the head. It is by the motion of these bony plates that the water is expelled which is taken in by the mouth, and which, after passing among the gills, and supplying them with air, passes out by the gill-orifices at the back of the head. Besides these opercular plates or bones, a series of flattened rays, connecting them with the bone of the tongue, and called the *branchiostegal rays*, aid in forming the gill cavities. In the branchiostegal rays, distinctive characters of fishes are often found.

The brain of fishes differs very considerably from that of other vertebrate animals: (see Brain). In general, they possess the nerves and organs of all the senses, though the senses of touch and taste are commonly supposed to be more dull than in many other animals; and a few fishes, living chiefly in mud, or in the waters of caverns, are destitute of eyes, and consequently of sight, though even they possess optic nerves, and seem sensitive to light. But in most fishes the eyes are large, and vision is evidently very acute; and some have cirri or barbules near the mouth, filaments proceeding from some of the fin-rays, etc., which are regarded as delicate organs of touch, adapted to the wants and habits of the particular species. The eyes are covered by the skin, modified in its character, and have no eyelids nor nictitating membrane. They are very variously placed in different kinds. There is no external ear.

The mouth is the only organ of prehension. It is very different in different kinds—sometimes very small, sometimes extremely large, sometimes forming a sucker by which the fish can both fix itself and pump up the fluids of the animal on which it preys. The snout is also abbreviated, prolonged, or otherwise modified in very various ways. The teeth are far more various in form, number, position, and structure, than in any other class of animals. They never have any roots, but are fixed to the bones which support them; they fall off, however, and are replaced. Some fishes have no teeth; some have very small teeth; some have teeth in great number, but so fine as to resemble the

hairs of a brush; some have short thick teeth; some have long sharp teeth, either straight or crooked; some have teeth so flat and close that they resemble a regular and beautiful pavement; and the teeth of fishes are sometimes situated not only on the jaw-bones, but on the *vomer* or bone extending along the middle of the roof of the mouth, and indeed, also, on other parts of the palate to the very throat, and very commonly on the tongue. The food of fishes is various: a few subsist on vegetable food of different kinds, but most of them on animal food, of which there is no kind that does not seem to be particularly agreeable to some of them from the mere animalcule or the most minute crustacean to the flesh of the mammalia. In general, they are excessively voracious, and seem to spend most of their lives in seeking food. Many of them prey on other fishes, and many seem equally willing to devour other species or the younger and weaker of their own. Some of them swallow their food almost or absolutely alive; others subject it to processes of comminution, trituration, and mastication in the mouth. Salivary glands are not found in fishes, though they exist in some of the invertebrate animals. The digestive process seems to be performed very rapidly. The stomach and intestines vary very much in different kinds. The kidneys are in general extremely large, extending through the whole length of the abdomen.

The *air-bladder* is found in many fishes, but not in all; and is present or absent in different fishes even of the same genus or family: (see AIR-BLADDER). Its uses, and its connection with the habits of particular species, have as yet been but partially ascertained.

Fishes are oviparous (egg-producing); a few are ovoviviparous (eggs hatched within the body, and young produced alive). The chief reproductive organs are generally two elongated lobes of a fatty substance, *milt*, in the males, and of rudimentary eggs, *roe*, in the females. Impregnation usually takes place after the *roe* or *spawn* is deposited, the male accompanying the female to the place of spawning. In some Cartilaginous Fishes, it takes place before the deposition of the eggs; and male sharks and rays are furnished with organs called *claspers*, the use of which is well indicated by the name. The fecundity of fishes is generally very great, and their eggs very small in proportion to the size which they ultimately attain, though this is not so much the case in the Cartilaginous Fishes already mentioned. Some of the fishes most valuable to man, as the salmon, herring, and cod, are remarkable for fecundity. Nine millions of eggs have, according to Leuwenhoek, been ascertained to exist in the roe of a single cod; and provision is thus made both for the preservation of the species amid all the dangers to which the spawn and the young are exposed, and for the wants of man. The spawn of fishes is deposited in very different situations, according to the different kinds—as by some on aquatic plants, by some on beds of sand or gravel; but

many species leave the depths of the ocean in order to deposit it in shallower waters, and some, usually marine, ascend rivers for this purpose. Very few fishes take any care of their eggs or young; but there are remarkable exceptions to this rule, and some of the gobies and sticklebacks are known to tend their young with great care. Sticklebacks also construct nests (see STICKLEBACK). It is not long since this curious fact was discovered, though these little fishes have been long familiarly known; and it is therefore not improbable that many other fishes may have the same habit.

The growth of fishes is very rapid when supplies of food are abundant, but becomes slow in less favorable circumstances, or is arrested for a long time, in a manner to which there seems nothing similar among other vertebrate animals.

The skin of fishes is generally covered with Scales (q.v.), which, however, are sometimes minute and imbedded in the skin, and sometimes altogether wanting. The scales are either horny or bony, and are generally imbricated, like the slates of a roof, their free ends backward; but sometimes form bony plates, fixed by the whole of their lower surface. They usually exhibit beautiful symmetrical markings and inequalities of surface of various kinds, and in some are covered with a thick coat of enamel. The differences of character in the scales have been made the foundation of a classification of fishes by Agassiz, by whom all fishes are distributed into four orders of *Cycloid, Ctenoid, Placoid,* and *Ganoid Fishes* (see these titles), having respectively cycloid, ctenoid, placoid, and ganoid scales; a classification which has been found particularly convenient with reference to fossil fishes, though other systems maintain their ground against it as preferable for recent species. It is not, however, wholly artificial, for a relation can be very generally traced between the character of the scales and the general structure and economy of a fish. The scales of a row extending from the head to or toward the tail on each side of the body of Osseous Fishes, in a somewhat waved line, called the *lateral line,* are pierced for the transmission of a slimy matter, with which the whole body is lubricated. The colors of fishes depend upon a substance consisting of small polished laminæ, secreted by the skin. As fishes need no covering, like fur or feathers, to prevent the dissipation of their animal heat in the surrounding medium, their scales must be regarded chiefly as defensive armor. Some of them are defended also by large bony plates, either on the head alone or also on the body, and some by spines connected with the fins, gill-covers, etc. Few have any other offensive weapons than their teeth, but the spine attached to the tail of some rays is a remarkable exception, as is also the elongated snout or beak of the sword-fish, saw-fish, and a few others. But a much more remarkable kind of armor—probably both offensive and defensive—is possessed by a few fishes in an electrical apparatus, by

which they can give severe shocks. It is also an interesting fact, that the electrical apparatus is quite different in different fishes possessing it, the Gymnotus or Electric Eel, the Torpedo, and the Electric Silurus or Malapterurus.

Many fishes are gregarious, swimming in shoals, which in some species consist of immense multitudes. Some also make periodic migrations; salmon, for example, ascending rivers, and herrings and pilchards visiting coasts; but the long migration formerly ascribed to these fishes is now doubted or disbelieved. The occasional overland migrations of eels, and the more frequent overland migrations of some tropical fishes, cannot but be regarded with peculiar interest; and the instinct is very wonderful by which, when fleeing from a pool that is about to be dried up, they direct their course toward a place where water is more abundant. This faculty is, however, rare, though possessed by tropical fishes both of the eastern and western hemispheres, but more generally the fishes destined to inhabit tropical ponds liable to be dried up, are capable of living dormant, imbedded in the mud, till they are liberated again by the rains, when they reappear in their former multitudes.

Of the uses of fishes to man, by far the most important is that of supplying food. Fishes form an article of food in almost all countries, and in some a principal part of the food of the inhabitants. Many fishes are highly esteemed for the table, which are not procured in sufficient abundance to be a principal part of food in any country. Some fishes on the contrary, are unpalatable; and some, mostly tropical, are poisonous, while others are poisonous only at particular seasons.—The skin of some Cartilaginous Fishes yields SHAGREEN (q.v.), and the air-bladder of some fishes yields ISINGLASS (q.v.). The minute laminæ which give brilliancy of color to some, and the similar substance found in the air-bladder of others, afford the materials of which artificial pearls are made.—Oil useful in lamps is obtained from a number of fishes and the medicinal value of cod-liver oil is well known.

The classification of fishes most generally adopted is that of Cuvier, who divides them into OSSEOUS FISHES (having true bones), and CARTILAGINOUS FISHES (q.v.), and divides Osseous Fishes into Acanthopterous Fishes (*Acanthopterygii*, q.v.), and Malacopterous Fishes (*Malacopterygii*, q.v.). The system of Agassiz has already been noticed. That of Müller and Owen differs from both.

Fossil Fishes.—The medium in which fishes live, and the hard and almost indestructible nature of some portions of their skeletons—as their teeth, spines, and scales—would lead us to anticipate their frequent occurrence in the Sedimentary rocks; but inasmuch as the soft parts of the animal are liable to speedy decomposition, the remains of fish must often exist in a fragmentary and scattered condition. Thus, the teeth in the shark, the spine defense in the sting ray, and the scales in the bony pike, would survive the total destruction of the cartilaginous

skeleton as well as the soft portions of these fish, and would alone remain to testify to their existence. The earliest ichthyic remains are of this fragmentary character. They have been obtained from the 'Ludlow rock', a member of the Upper Silurian series, and consist of spines and portions of skin, that have been thickly covered with hard tubercles and prickles, like the shagreen of the shark's skin. The spines most nearly resemble the dorsal spine of the dogfish; they are small, flattened, and slightly curved. With similar fragmentary remains, they have been placed under the somewhat indefinite generic title *Onchus*. The minute, compressed, conical, and glistening bodies, called *Conodonts*, obtained in great numbers from the Lower Silurian measures in Russia, and considered by their describer Pander, to have been the teeth of fishes belong certainly to very different animals. Their small size and peculiar forms, and the entire margin of the hollow base by which they were attached, show them to have been the denticles from the lingual ribbon of shell-less mollusks, which have left no other traces of their existence than these remarkable Conodonts. The Ludlow bone-bed contains the earliest noticed fish remains. No idea of the numerical importance of fishes at this early period can be satisfactorily formed; yet these remains being confined to a single thin bed, and occuring rarely even in that, seem to indicate that the Silurian seas were but thinly tenanted by these earliest sharks. In the immediately succeeding Devonian rocks, their numbers largely increased. The ichthyo-dorulites, or fossil spines of this period, have been referred to 14 different genera. Numerous species of true ganoids have been determined from their well-preserved enamel scales, which occur singly or in confused groups, and frequently also associated with the head, fins, and tail, so as to present a faithful 'nature-print' of the fish upon the rock: (see DIPTERUS; DIPLACANTHUS; etc.) But the most remarkable and characteristic fossils of this period are the Buckler-fishes, whose head and part of their body were covered with bony plates, giving them so singular and anomalous an appearance, that some were originally considered crustacean. They are almost confined to the Old Red Sandstone series, a single species (in Permian strata) being the only cephalaspid that is known later. See CEPHALASPIS; COCCOSTEUS; PTERICHTHYS; etc.

Fish remains are of frequent occurrence in the Coal-measures. More than 20 species of plagiostomous fishes have been determined from the spine defenses, some of which are very large and powerful. The frequency with which the peculiar teeth of the cestracionts are found, show that they must have been common in the carboniferous seas. Ganoids also were abundant. See PALÆONISCUS; HOLOPTYCHIUS; etc. In the Permian period, the forms are similar to those in the older strata. Till the last Permian deposit, the fish have all possessed heteroceral tails; but with the Secondary rocks, the homocercal

tail not only appears, but becomes the more frequent form. Numerous species and many new forms appear in the Trias and Oolite. Sharks are remarkably abundant in the Cretaceous strata; but the Chalk is remarkable specially from containing the earliest discovered remains of the true bone-fishes—those covered with ctenoid and cycloid scales. In the Tertiary strata, the character and proportion of ichthyic remains show a condition in the inhabitants of the water very similar to what at present prevails. The cartilaginous orders decrease, and are replaced by osseous fishes, such as the salmon, cod, turbot, and herring.

FISHES, Royal: those which at common law are the property of the crown. These are the whale and the sturgeon, when either thrown on shore, or caught near the coast. The ground of the privilege is said to have been the superior value of these fishes. They were considered too precious for a subject, just as the Swan (q.v.), which was a royal bird, was too good for any table but the king's. 'Our ancestors,' says Blackstone, 'seem to have entertained a very high notion of the importance of this right, it being the prerogative of the kings of Denmark and the dukes of Normandy; and from one of these it was probably derived to our princes. The most ancient treatises of law now extant make mention of it.'—Stephen's *Com.* ii. p. 547. Strictly, it was the head only of the whale which belonged to the king, the tail being a perquisite of the queen consort (*Ib.* p. 457). In Scotland, whales thrown on shore above six horse-power draught, belong to the queen or her donatary, the admiral.

FISH-HOOK: sharp curved implement used in angling (q.v.: see also Fishing). Considerable skill is required for the manufacture of these simple articles. There are two kinds in the market, known as the English, and the Limerick, the latter long in the highest repute among anglers though not so much preferred. Great numbers of fish-hooks are made at Redditch, in Worcestershire, England. Steel-wire is cut into the required lengths, and softened, then the ends of three of these are inserted into shallow holes of a sort of rest or standard, and thus supported, the barbs of all three together are cut up by the skilful pressure of a stout knife; they are then pointed, and turned by pressing them against a little ridge of sheet-brass let into a block of wood, and having the requisite curvature. The other end is next flattened out, by laying it on a small anvil, and striking a blow with a hammer. This is done to prevent the silk-ligature from slipping over the end. The finer worm-hooks have the shanks filed, in order that the silk dressing may not enlarge the shank so much as to prevent the slipping of the worm over it. They are then hardened, and blued. The Limerick hooks are made by cutting the steel,which is made from the best malleable iron, into lengths for two hooks The ends are then forged out to the shape of barb and point, and the barb is undercut

with a file from the solid forged end, instead of being cut and turned up with a knife. On this the reputation of the Limerick hooks depended. They are shaped to the required curve by grasping them in circular pliers, and bending the wire with a turn of the wrist. There are other variations in form, prepared by some fishers for certain purposes.

FISH'ING: capture of fishes. Fishes for food dates from the most remote antiquity, and is probably at least as ancient as the hunting or trapping of any kind of wild animal. The supply of food yielded to man by the waters seems always to have borne a considerable proportion to that yielded by the land. Of all modes of capturing fish, the most simple and primitive is that of taking them with the hand, called in the east of Scotland *gumping*, in the west *ginneling* or *guddling*. Even sea-fish are sometimes taken by the hand, approaching the shore in such dense shoals that the water seems almost filled with them. This is particularly the case on the n.w. coast of N. America, where fish appear to abound more than in any other part of the world; and there besides the occasional use of the mere hand, the Indian often catches fish by a hand-net or a basket, paddling his canoe into the midst of the shoal, and as it were baling the fish out of the water The use of the net, in various forms, and of the hook and line, as well as of the fishing rod, are very ancient. Allusion is made in several places of the Old Testament to the use of nets and hooks in the capture of fish. Some of the most important fisheries, as the herring-fishery, are carried on almost exclusively by the net, but with nets of very different kinds for different fisheries: (See FISHERY; NETS; also HERRING; SALMON, and other titles of the most important kinds of fish). The capture of some very valuable kinds of fish—as cod, haddock, and others of the same family—is chiefly by the hook and line; and either by what is called the *long-line*, to which many hooks are attached, and which is extended horizontally over a bank frequented by the fish, the line's place being marked by floats, and the line drawn after the lapse of at least several hours; or by the *hand-line*, which, being let down over the side of a boat with a *sinker* proportioned to the strength of the current, is watched by a fisherman holding it in his hand, and hauled up immediately on a fish being felt to bite. The baits are various, according to the opportunity of procuring them and the kinds of fish. The use of the fishing-rod with the hook and line is not so general for the capture of sea-fish as of fresh-water fish (see ANGLING) though a rude-fishing-rod is often used for the capture of some sea-fish. The pollack (q.v.) or lythe, the mackerel, and some other sea-fish are caught often by rod-fishing from boats under sail. The young of the Coal-fish (q.v.) are caught in great numbers by the fishing-rod from rocks on coasts; and this, chiefly an amusement for boys in many places, supplies the inhabitants of Orkney and Shetland, and of some other

regions with a considerable part of their food. The shooting of fishes with arrows is practised by some S. American Indians; some very large kinds of fish—as the Arapaima (q.v.)—are occasionally harpooned; and many large fish, both of the sea and of fresh water, are killed by spears—a mode of fish-capture common in parts of Scotland, and much employed by salmon-poachers: the spear—three-pronged—is known as a *leister*. Torches also are used by night in many parts of the world, both in sea and river-fishing, to attract fishes by the light, which in this way has an almost certain effect. The poacher on a Scottish salmon-river conjoins the use of the torch with that of the leister, and this is popularly known as 'burning the water'. It is now wholly illegal in that country, as is the use of the leister under any circumstances. The flying-fish is similarly attracted by torches on the coasts of the South Sea Islands, but a small net is used instead of a fish-spear. The inhabitants of the South Sea Islands take advantage of the habit of some fishes, of leaping out of the water when alarmed, to catch them by means of rafts in the shallow lagoons, encircling them so that they finally leap upon the rafts. The Indians of n.w. America sometimes adopt a similar method of capturing the Viviparous Fish (q.v.) of their coasts. For other peculiar modes of catching fish in use among them, see CANDLE-FISH; SALMON (of N. America). They also take the Vancouver Island herring (see HERRING, VANCOUVER ISLAND) by constructing long dams of lattice-work on flats left dry by the retiring tide, in which the fish are caught which have come in with the tide. This method of taking herring has long been known on the British coasts; and *cruives*, lattice work constructions of smaller size, have been used with great success in many places. Cruives are very effective also in the capture of salmon, a suitable place of the river being chosen for them, and they being so contrived that the fish readily get in, but do not readily get out. A very peculiar mode of taking fresh-water fishes is practised in Ceylon, by means of a funnel-shaped basket, open at both ends, which is suddenly plunged down, the wider end downwards, till it sticks in the mud, when, if the fish is felt to beat against the sides, it is taken out with the hand.

The capture of fresh-water fish by means of vegetable poisons of various kinds, is practised equally in the E. Indies, in Africa, and in the warm parts of America. The poisons used do not render the fish poisonous. The poisoning of trout and other river-fish with lime is too frequent in some places, is most reprehensible—all the fry, as well as the fish fit for the table, being destroyed, and the mischief often extending much farther down the stream than its perpetrators proceed.

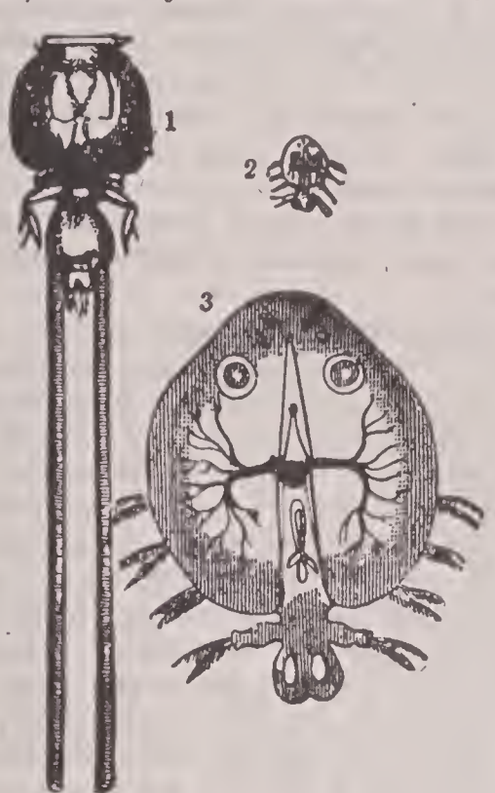
Cormorants are trained by the Chinese for the capture of fish. Otters also have frequently been trained and employed for the same purpose.

FISH'ING-FROG: see ANGLER.

FISH'ING-TACK'LE: see ANGLING.

FISHKILL, *fĭsh'kĭl:* town and village of Dutchess co., N. Y.; on the Hudson river and F. creek and the Hudson River and Dutchess and Columbia railroads; opposite Newburg. The town contains also the villages of Fishkill Landing, Glenham, Matteawan, Carthage Landing, Hughsonville, and part of Wappinger Falls. It is 58 m. n. of N. Y., and has Mount Bacon Acad., several churches, a savings bank, two machine shops, and a hat factory. The village is 5 m. n.e. of the Hudson river. Pop. (1900) 3,673; (1910) 4,418.

FISH-LOUSE, or SEA-LOUSE: entomostracous crustacean of the order *Siphonostoma.* All the creatures of this order are small, and are parasitic on fishes, aquatic batrachians, etc., on the juices of which they live, though



Fish Louse:
1, *Caligus* (female); 2, *Argulus*, natural size; 3, *Argulus*, magnified.

they have also the power of swimming freely in the water, some of their legs being adapted to this purpose; indeed, they can swim with extreme rapidity, making use of this power to gain that place where they may may obtain food at the expense of other creatures. They do not begin life as parasites, the females depositing their numerous eggs on stones, plants, etc. They are animals of singular form and appearance. The genera *Argulus* and *Caligus* are now regarded as the types of two families. In the former, there is a curious sucking disk on each side of the beak or proboscis, though there are also jointed members terminated by prehensile hooks. In the latter, the hooks of the anterior pairs of feet are the principal organs of adhesion to the slippery bodies of the fishes from which food is to be drawn; and the abdomen of the female is fur-

nished with two remarkably long tubes, the functions of which are not perfectly ascertained. The bodies of all are transparent or nearly so. Some of the Coligidœ are common on many kinds of sea-fishes; *Argulus foliaceus* on fresh water fishes, and even on tadpoles. Sickly fishes often become victims of multitudes of these creatures.

The name fish-louse is sometimes given also to the *Lernœidæ*, but they are very different.

FISK, or Fisc, *fisk* [see Fiscal]: term often found in Scottish law-books; derived from Latin *fiscus*, literally, a wicker-basket, which came ultimately to signify the privy purse of the emperor, as distinguished from the public treasury which was called *ærarium*. In Scotland, it signifies generally the crown's revenues, to which the movable estate of a person denounced rebel was formerly forfeited. It still gives his name to a very important officer, the procurator fiscal (q.v.), or public prosecutor in the first instance, by whom all crimes are prosecuted before sheriffs and other inferior judges, and whose duty it is to report to crown counsel—i.e., to the lord advocate, or his deputies—all cases which, from their aggravated character, require to be tried by a higher court. See Public Prosecutor.

FISK, Clinton Bowen: 1828, Dec. 8—1890, July 9; b. York, N. Y. He removed with his parents to Mich. 1830; received a common-school education, and studied two years in Wesleyan Acad., Albion, Mich.; became a merchant, miller, and banker; and settled in St. Louis, 1858. In 1861 he enlisted as a private in the Union army, going to the field with a St. Louis regiment; shortly afterward returned, recruited the 33d Mo. vols., and was elected col.; was promoted brig.gen. for meritoriou services 1863; and brevetted ma.gen. of vol. 1865. He served in the army of the Tenn., took part in the seige of Vicksburg, commanded the 13th div. of the 13th army corps, accompanied the expedition against Fort Ptmberton, and commanded the dists. of S. E. Mo., St. Louis, and N. Mo., and the Jefferson city post. At the close of the war he entered the Freedman's Bureau as asst. commissioner, had Ky., Tenn., Ark., Mo., Ala., and Ga. in his dist., and was highly successful in his administration. In 1866 he established a school for freedmen in Nashville, which has since become world-famed as a univ. bearing his name. On the completion of his work among the freedmen in the south, he removed to Seabright, N. J., became pres. of the board of Indian commissioners 1864, prohibition candidate for gov. of N. J. 1886, and prohibition candidate for pres. of the U. S. 1888. He was a liberal promoter and officer of the principal educational institutions of the Meth. Episc. Church.

FISK, James, Jr.: 1835, Apr. 1—1872, Jan. 6; b. Pownal, Vt. He received a meagre education, became a pedler, and was afterward clerk and partner in a large dry-goods store in Boston. In 1863 he removed to New York,

started the New York and Boston lines of palace steamboats, bought the Stonington line of Sound steamboats, engaged in the banking and stock business, was elected a director in the Erie railroad 1867, became its vice pres. and treas. with Jay Gould as pres., bought the new Pike's Opera house, establishing the offices of the railroad company in its magnificent apartments, and promoting the presentation of opera bouffe in its grand theatre, and became col. of the 9th regt. N. G. S. N. Y. His career in New York was one of boldness, dash, and continual excitement. He organized and equipped a band of 100 pieces for the regt., personally collected many large wagon-loads of supplies for the sufferers by the Chicago fire 1871, and rushed two relief trains from New York to the stricken city before the conflagration was extinguished. He was unscrupulous, impulsive, shrewd, and even brilliant in his transactions; and met his death at the hands of Edward S. Stokes, who accused him of attempting to ruin him in some oil dealings.

FISK, Wilbur, D.D.: 1792, Aug. 31—1839, Feb. 22: b. Brattleborough, Vt.; son of Judge James Fisk. He graduated at Brown Univ. 1815, began studying law, but was forced to abandon it by serious illness; entered the itinerant ministry of the Meth. Episc. Church 1818, and soon achieved wide fame as a pulpit orator. He removed to Charlestown, Mass., 1819, was ordained deacon 1822, and was presiding elder of the Vermont district 1823–27. In 1826 he was chaplain of the Vermont legislature, 1826–30 was the first principal of Wilbraham Acad., Mass., and 1830 was elected first pres. of Wesleyan Univ., Middletown, Conn. He was active in organizing Wilbraham Acad., Wesleyan Univ., and the Or. Indian mission; visited Europe for his health 1835–6; was elected bp. of the Meth. Episc. Church but declined 1836, and became a member of the Conn. state board of education 1839. Besides an account of his European travels, he published *Inaugural Address* (New York, 1831); *Calvinistic Controversy* (1837); *Sermons and Lectures on Universalism; Reply to Pierpont on the Atonement;* and other theological and educational works. He received the degree D.D. from Augusta College, Ky., 1829, and Brown Univ. 1835.

FISKE, Amos Kidder, American editor and author: b. Whitefield, N. H., 1842, May 12. He was graduated at Harvard 1866, and admitted to the bar 1868. He collaborated with George Ticknor Curtis in the 'Life of Daniel Webster' and was a large contributor to the revised edition of the *American Encyclopædia* (1873–6). He served for 20 years on the editorial staff of the New York *Times*, joining the staff of the *Mail and Express* 1900. His published works are: *Midnight Talks at the Club* (1890); *Beyond the Bourn* (1891); *The Jewish Scriptures* (1896) *The Myths of Israel* (1897); *The Story of the Philippines* (1898); *The West Indies* (1899). *The Modern Bank* (1904).

FISKE, Bradley Allen, American naval officer: b. Lyons, N. Y. 1854, June 13. He was appointed a cadet

midshipman in the United States navy in 1870; and became lieutenant-commander 1900, March 30. He invented a boat detaching and attaching apparatus for warships in 1877; the first electric ammunition used in the navy in 1888; electric gun-training apparatus and electric steering gear the same year; range- and position-finders in 1889; improvements of the range-finder and electric steering gear in 1895; and an electrical apparatus for transmitting the orders of a ship's commander from the deck bridge to the engine room in 1896; and has been attached to the Naval Bureau of Ordnance since 1895. Author: *Electricity and Electrical Engineering; Electricity in Theory and Practice.* Member Naval Wireless Telegraph Board, 1904–5. He has made many useful scientific inventions. Received the Elliott Cresson gold medal from Franklin Institute (1893); gold medal for prize essay, by U. S. Naval Institute (1905).

FISKE, Fidelia: niece of Pliny Fiske: 1816, May 1—1864. Aug. 9; b. Shelburne, Mass.: missionary. She graduated at Mount Holyoke Seminary 1839, and was a teacher there till 1843, when she became a missionary to the Nestorians of Persia. She labored in that field with great zeal 15 years, passing the greater part of the time as a teacher, and becoming the first principal of the seminary at Oroomiah. She returned home with health seriously impaired 1858, published a *Memorial of Mount Holyoke Seminary,* and *Woman and her Saviour in Persia,* and was preparing recollections of Mary Lyon, her early seminary friend, at her death.

FISKE, John: 1744, Apr. 10—1797, Sep. 28; b. Salem, Mass.: naval officer. He was bred to the sea, and 1776, July 8, was commissioned capt. of the *Tyrannicide,* the first war vessel equipped by the state of Mass., with which he rendered the patriot cause important service. In 1777, Dec., he was given command of a larger state vessel the *Massachusetts.* He served till the close of the war; then engaged successfully in commercial pursuits, and became a state official and maj.gen. of militia.

FISKE, John, A.M., LL.B.: author: b. Hartford, Conn., 1842, Mar. 30; d. Gloucester, Mass., 1901, July 4. His name was originally Edmund Fiske Green, but he took that of his maternal grandfather 1855. He graduated at Harvard University 1863, and Harvard law school 1865; was admitted to the bar but never practiced. In 1869 he was appointed lecturer on philosophy at Harvard, 1870 instructor in history, and 1872 asst. librarian. He was elected an overseer 1879 and 85, was lecturer on American history in Washington Univ., St. Louis, from 1881, and prof. of that branch there from 1884 and was lecturer on the subject in University College, London, 1879, and in the Royal Institution of Great Britain 1880. He was associated with Gen. James Grant Wilson in editing *Appleton's Cyclopædia of American Biography,* 6 vols. (New York, 1886–89). He published *Tobacco and Al-*

cohol (1868); *Myths and Myth-Makers* (1872); *Outlines of Cosmic Philosophy, based on the Doctrine of Evolution* (1874); *The Unseen World* (1879); *Darwinism and Other Essays* (1879–85); *The Destiny of Man Viewed in the Light of his Origin* (1884); *The Idea of God as affected by Modern Knowledge* (1885); *American Political Ideas viewed from the Standpoint of Universal History* (1885); and a *History of the American People* (1889).

FISKE, Lewis Ransom, American Methodist minister and educator: b. Penfield, N. Y., 1825, Dec. 24, d. 1901. He was graduated at the University of Michigan 1850, entered the Methodist ministry, and held pastorates in Jackson, Ann Arbor, and Detroit. He taught in the State Normal School and the State Agricultural College of Michigan; was president of Albion College 1877–98; and professor emeritus of philosophy there from 1898. He was editor of the Michigan *Christian Advocate* (1875–9). He published: *To-day and To-morrow* (1898); *Choosing a Life-Work* (1900); *Human Life and Its Forces* (1901).

FISKE, Stephen, American editor and author: b. New Brunswick, N. J., 1840, Nov. 22. He was graduated at Rutgers College and early became an editorial writer on the staff of the New York *Herald*, for which newspaper he acted as special correspondent in the suite of the Prince of Wales, now king of England, while the Prince was traveling in the United States and Canada, and later as war correspondent. For many years he was dramatic critic of the *Herald*; afterward managing the St. James Theatre and the Royal English Opera Company in London, and the Fifth Avenue Theatre, New York, presenting Modjeska and Mary Anderson. Among his works are: *English Photographs; Off-hand Portraits of Prominent New Yorkers;* and several plays including: *Corporal Cartouche; Martin Chuzzlewit; My Noble Son-in-Law; Robert Rabagas.* Now dramatic critic, *Sports of the Times.* Originated New York *Dramatic Mirror* and the Actors' Fund.

FISSEL: see Fissle.

FISSENLESS, a. *fĭs'ĕn-lĕs* [see under Foison]: in *Scot.* destitute of substance or pith; foisonless; tasteless.

FISSICOSTATE, a. *fĭs-sĭ-kŏs'tāt* [L. *fissus,* pp. of *findo,* I cut, I cleave; Eng. *costate*]: having the ribs divided.

FISSIDENS, n. *fĭs'sĭ'dĕnz* [L. *fissus,* cloven; *dens,* a tooth]: in *bot.*, typical genus of the family *Fissidenteæ,* a tribe of operculate apocarpous mosses.

FISSILE, a. *fĭs'sĭl* [L. *fissĭlĭs,* that may be split—from *fĭssŭs,* cleft: It. *fissile*]: capable of being split—applied to rocks which, like clay-slate, can be split or divided into thin layers. Fissil'ity, n. *-sĭl'ĭ-tĭ,* the quality of admitting to be split in thin leaves.

FISSILINGUIA, n. *fĭs'sĭ-lĭng'gwĭ-ă* [L. *fissus,* cleft; *lingua,* the tongue]: a division of Lacertilia or lizards having bifid tongues.

FISSION, n. *fĭsh'ŭn* [L. *fissus,* cleft or split]: a cleav-

ing or splitting into parts. FISSIPARA, n. *fĭs-sĭp'a-rȧ* [L. *părĭŏ*, I bring forth]: animals propagated by fission. FISSIP'AROUS, a. *-a-rŭs*, applied to the multiplying or increase of certain animal forms by the self-division of the individual into two or more parts, each of which becomes a perfect creature similar to the parent-original; in *bot.*, dividing spontaneously into two parts, by means of a septum.

FISSIPALMATE, a. *fĭs-sĭ-păl'māt* [L. *fissus*, cleft, divided; Eng. *palmate*]: having the membranes between the toes deeply cleft or incised, as in the foot of a grebe.

FISSIPED, a. *fĭs'sĭ-pĕd:* having separate toes; cloven footed: N. animal having the toes separate or not connected by a membrane, as in the carnivorous mammals, *Felidæ*, *Canidæ*, etc.

FISSIROSTRES, n. plu. *fĭs'sĭ-rŏs'trēz* [L. *fissus*, cleft, *rostrum*, a beak]: sub-order or tribe of birds, in the great order *Insessores*. It is characterized by peculiar width of gape, and the bill is depressed or horizontally flattened, short, and often furnished with strong bristles at the angles, the birds of this tribe being insectivorous, and generally subsisting by catching insects on the wing, to which this structure of bill is beautifully adapted. The powers of flight are generally great, but the legs are short and weak. Swallows and goat-suckers are familiar examples of this order.

FISSLE, v. *fĭz'zl* [a freq. from *fuss*]: to make a slight, continued, rustling noise.

FISSURE, n. *fĭsh'ûr* [F. *fissure*—from L. *fissūrȧ*, a cleft or slit]: a crack or cleft; a slit from the parting asunder of any substance: V. to open as a fissure. FISSURED, pp. *fĭsh'ûrd*, cracked; full of cracks.

FISSURELLIDÆ, *fĭs-sūr-ĕl'ĭ-dē:* family of gasteropodous mollusks, of the order *Scutibranchiata*. The shell much resembles that of the limpet family (*Patellidæ*), but has either a hole at the apex, or a slit at the front margin. The hole at the apex characterizes the genus *Fissurella* (Keyhole Limpets), and the slit appears in the genus *Emarginula*. These openings of the shell are subservient both to the passage of the water requisite for respiration, and the discharge of the excrements. The fissurellidæ resemble limpets in their habits, and are found either on the sea-shore or at no great depth. They are widely distributed over the world.

FIST, n. *fĭst* [OE. *fust;* Ger. *faust*, the hand as an instrument of striking: Swiss, *fausten*, to beat: Dut. *vuist*, the fist: L. *fustis*, a stick]: the hand with the fingers doubled into the palm; the closed hand: V. in *OE.*, to strike with the fist; to gripe or clutch closely and firmly with the hand. FIST'ING, imp. FIST'ED, pp. FISTY, a. *fĭs'tĭ*, connected with the fist; pugilistic. FIST'IC, a. *-ĭk*, pertaining or relating to boxing or pugilism; pugilistic. FISTIANA, n. *fĭst-ĭ-ân'a*, collection of anecdotes and information relative to pugilists and the prize ring; boxiana. FISTICUFFS, n. *fĭs'tĭ-kŭfs*, battle with the fists.

FISTUCA, n. [L. a rammer]: a pile-driver; a monkey.

FISTULA, n. *fĭs'tū-lă* [L. *fĭstŭlă*, a hollow reed: It. *fistola:* F. *fistule*]: a deep, narrow ulcer or sore: FIS'TULATED, a. *-lā-tĕd*, made hollow like a pipe. FIS'TULOUS, a. *-lŭs*, of the nature of a fistula; in *bot.*, hollow, like the stems of grasses; also FIS'TULAR, a. *-lĕr.—Fistula*, in former times, was applied, in its etymological meaning of a *pipe*, to such abscesses as had contracted to narrow, hard, open passages in the soft tissues of the body, lined by a kind of false membrane, giving rise to a thin discharge. At the present time, the term is generally limited to the opening of such a passage in close contact with a mucous membrane. Thus, it is common to speak of salivary, urinary fistula, etc.; and the most common and troublesome kind of all is the fistula in ano, in connection with the lower bowel, or rectum.

For the cure of salivary or urinary fistula, all that is generally necessary is to restore the patency of the ducts, which is done by passing instruments along them. Should a fistula, however, be where it is surrounded by muscular fibres, as at the orifice of the lower bowel, it is necessary to divide these muscular fibres, so as to leave the part at rest while nature repairs it. As the sinus, which is the continuation inward of the fistula, is lined with imperfectly organized lymph, it is generally necessary to stimulate the part by the introduction of lint, either alone or saturated with some irritant, such as the sulphate of zinc.—At times however, fistulæ require more elaborate treatment, and are extremely difficult to close, especially those which result from loss of tissue between two adjacent mucous canals.

Fistula, in farriery, is a chronic abscess affecting horses, deep-seated, discharging through pipe-like openings. It appears on the withers or on top of the head; in the latter place, called poll-evil. It is caused by blows, galls, accidental injuries, and neglect. Treatment: caustic applications. If the fistula be obstinate, it may be necessary to cut the walls of the pipe and wash in antiseptic solutions. Fistula should be attended by a veterinary surgeon.

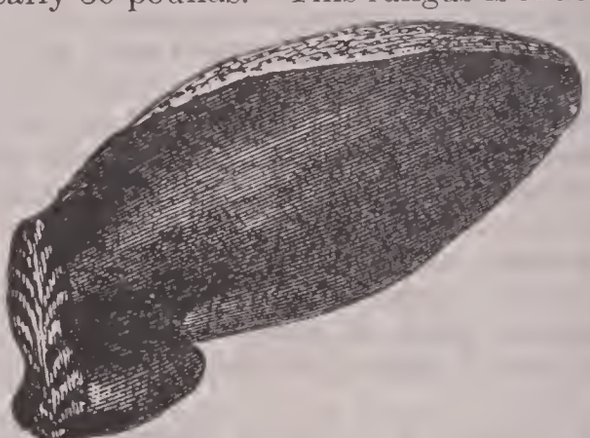
FISTULARIDÆ, *fĭst-ū-lăr'ĭ-dē*, or AULOSTOMIDÆ, *aw-*

Snipe or Trumpet Fish (*Centriscus scolopax.*)

lŏs-tŏm'ĭ-dē, or FLUTEMOUTHS, *flūt'mowthz:* family of acanthopterous fishes, remarkable for the conformation of the head; the skull being elongated into a tube, at the extrem-

ity of which are the mouth and jaws. The species all are marine; they are widely distributed; a specimen is the snipe-fish, sea-snipe, or trumpet-fish (*Centriscus scolopax*). These fishes are not to be confounded with the pipe-fishes, which have similar elongation of snout, but are otherwise very different.

FISTULINA, *fĭst-ū-lī'na:* genus of fungi allied to *Boletus* (q.v.); the under surface (*hymenium*) at first covered with minute warts, which ultimately form tubes. *F. hepatica* is common throughout Europe on old oak, walnut, and chestnut trees; it occurs also on ash and beech. It is semicircular, of very regular outline, with a lateral stem, or none; its color red; its substance fibrous and fleshy, much resembling beet-root. When old and beginning to decay, it looks like a mass of liver. It sometimes attains great size. Dr. Badham describes a specimen nearly five ft. round, and weighing eight pounds. Mr. Berkeley mentions one which grew on an ash pollard, and weighed nearly 30 pounds. This fungus is much esteemed



Fistulina Hepatica.

in parts of Europe as an esculent; it is wholesome and nutritious; and the abundance in which it may often be procured, makes it more worthy of regard; while there is almost no possibility of confounding it with any dangerous fungus. Its taste resembles that of the common mushroom, but is rather more acid. 'When grilled, it is scarcely to be distinguished from broiled meat.' It furnishes itself with abundance of sauce.

FIT, n. *fĭt* [It. *fiata;* OF. *fiede,* intermittent period, turn: prov. Sw. *futt,* a very brief interval of time: Ger. *fit,* an int. expressive of sudden disappearance, or of pain: mid. L. *ficta,* a pang]: popular name for convulsions (q.v.); any sudden attack of disease in which the body is often convulsed or deprived of sense; a temporary affection or attack of pain or illness; sudden and considerable disorder of the mind. FIT'FUL, a. *-fûl,* marked by sudden impulses or starts. FIT'FULLY, ad. *-lĭ.* FIT'FULNESS, n. BY FITS AND STARTS, intermittently; done only at intervals, and with fickle or changeable purpose.

FIT, n. *fĭt* [F. *faict,* wrought or fashioned for a purpose: Dut. *vitten,* to square, to fit: comp. Icel. *fitja,* to knit

together: L. *factus*, made]: close and easy setting of a dress: ADJ. suitable; convenient; becoming; qualified; right: V. to suit one thing to another; to adapt; to qualify for; to be proper or suitable. FIT'TING, imp. adapting; qualifying: ADJ. appropriate; becoming; suitable. FIT'TED, pp. FIT'LY, ad. *-lĭ*. FIT'NESS, n. qualification; adaptation; meetness; propriety; convenience. FIT'TINGLY, ad. *-lĭ*. FIT'TEDNESS, n. suitableness. FIT'TER, n. one who puts parts together, as machinery. TO FIT OUT, to furnish with necessaries. TO FIT UP, to prepare for reception or use.—SYN. of 'fit, a.': meet; adapted; adequate; prepared; proper; appropriate; expedient; congruous; correspondent; apposite; apt; adapted; competent.

FIT, n. *fĭt* [AS. *fitte*, a song; *fittian*, to sing: Icel. *fet*, a pace, a foot in poetry: Gael. *faidh*, a prophet or bard]: in *OE.*, part of a song or poem; a canto; a division of a song or dance.

FITCH, n. *fĭch* [It. *veccia*]: the vetch; a chick-pea; the *Vĭcĭă sătīvă*, ord. *Legumĭnōsæ*, the common vetch or tare; *Nĭgĕllă sătīvă*, ord. *Ranŭncŭlācĕæ*, the supposed fitches of Scripture.

FITCH, n. *fĭch*, ELEAZAR THOMPSON, D.D.: 1791, Jan. 1—1871, Jan. 31; b. New Naven; theologian. He graduated at Yale Univ. 1810, taught school two years, pursued advanced studies in Andover Theo. Seminary, and preached 1812–17, and then succeeded Pres. Dwight as prof. of divinity in Yale. His success was so large that the corporation were induced to organize a full theol. dept., 1822; and in this he had charge of the branches of homiletics, natural theol., and evidences of Christianity, besides filling the office of college preacher and pastor (Congl.) till 1852. Though compelled by ill-health to resign his more active labors, he retained the office of lecturer on theol. till 1861, and was prof. emeritus of theol. till death. His sermons have been published, and are notable for grasp of thought.

FITCH, JAMES: 1622, Dec. 24—1702, Nov. 18; b. Bocking, Essex, England: clergyman. He received a classical education; removed to New England, 1638; studied seven years with the distinguished ministers Hooker and Stone; became pastor of the First Church (Congl.) in Saybrook, Conn., 1646; and, after 14 years service there, was installed as the first minister of the church in Norwich. He learned the language of the Mohegan Indians, and was popular among them, preaching to them in their own tongue, sharing his land with them, and teaching them agriculture.

FITCH, JOHN: 1743, Jan. 21—1798, July 2; b. Windsor, Conn.: inventor. He attended a dist. school a short time, studied surveying, was apprenticed to a watch and clock maker, was driven from home by family cruelty, engaged in the foundry business and the manufacture of potash, and, removing to Trenton, N. J., 1769, established himself as a silversmith and watch and clock maker. During the early part of the revolutionary war he was the chief gunsmith for the colonial armies, but,

when the British took Trenton, they destroyed all his property. He then became a lieut. in the N. J. vols., and, after the Valley Forge winter, re-established himself as gunsmith. In 1780 he was appointed a deputy surveyor for Va., spent a year in making surveys in the w. wilderness, returned to Philadelphia, 1781, made another journey to the w. with a party of ten emigrants 1782, was attacked by Indians at the mouth of the Muskingum river, escaped from captivity, and reached Warminster, Penn., the next spring, penniless. While stopping in Warminster, he rudely cut, on a piece of board, a diagram of the country that he had traversed, and obtained a number of impressions from it by means of a cider-press, thus becoming the first American wood-engraver. In 1785 he completed a model of a boat to be propelled by steam, with sidewheels, and petitioned both congress and the Penn. legislature for aid in constructing a working-boat. In 1787 he was enabled to form a stock company and built *The Perseverance,* which made 3 miles per hour on Del. river, and contained the first double-acting condensing engine transmitting power by means of cranks, ever constructed. A second boat was tested, 1788, Aug. 22, at Philadelphia; a third, 1788, Oct.; and a fourth, 1790, Apr.; the latter being run through the summer as a passenger-boat between Philadelphia and Burlington at a speed of 8 m. an hour. At the height of his experiments his private resources gave out, his stockholders became discouraged, and he was forced to abandon his project. In 1793 he went to France to build a steamboat, but the Revolution prevented, and he returned home penniless and as a common sailor. He made several unavailing attempts to secure money to perfect his inventions, and in grievous disappointment ended his life by poison at Bardstown, Kentucky.

FITCH, William Clyde, American playwright and author: b. New York 1865, May 2. He graduated at Amherst College 1886. He has written many successful plays, among them: *Beau Brummell*; *The Climbers*; *The Way of the World*; *The Girl and the Judge*; *Barbara Frietchie*; *The Moth and the Flame*; *The Stubbornness of Geraldine*; also *The Girl with the Green Eyes*; *Her Own Way*; *Major Andre*; *Glad of It*; *The Coronet of the Duchess*; *The Woman in the Case.* He has made many adaptations. He is also the author of: *The Knighting of the Twins and Ten Other Tales* (1891); *Some Correspondence and Six Conversations* (1896); *A Wave of Life,* a novel.

FITCHBURG, *fich'bėrg,* Mass., city, one of the capitals of Worcester co., on a branch of the Nashua river, and on the Fitchburg division of the Boston & Maine, and the New York, New Haven and Hartford railroads. It includes the former villages of West and South Fitchburg, Cleghorn, Rockville, and Traskville, and is built on a series of hills, of which Mt. Rollstone, a mass of granite with forest-clad sides rising to a height of 434 ft.

above tide water, is chief. It has an excellent system of water works, a paid fire department with steam engines and electric fire-alarm telegraph, a public library, the Burbank Hospital, homes for old ladies and children, and is the seat of the Fitchburg State Normal School. Among its industries are granite quarries; manufactories of cotton yarns and woolens, ginghams, zephyrs, worsteds, firearms, bicycles, cars, steam-engines, electrical appliances, saws, paper, machinery, tools, and a number of other articles. Fitchburg was named in honor of Col. Timothy Fitch, a wealthy merchant of Boston, who owned considerable property there. Water was introduced from Scott and Shattuck brooks in 1871, and the place received a city charter the following year. It is governed by a mayor elected annually and a bicameral city council, of which the upper house is elected at large and the common council by wards. Pop. (1900) 31,531; (1910) 37,826.

FITZ, *fĭts* [Norm. F. *fiz*, the *t* having been inserted to preserve the old Norm. F. sound of *z=ts*—from L. *filĭus*, a son]: old Norman word signifying 'son', 'son of'. Like the Scotch *Mac*, the Irish *O'*, and the Oriental *Ben*, it is prefixed to proper names to signify descent, as in the Norman names Fitzwilliam, Fitzwalter, Fitzgerald. A later application of it has been to denote the natural sons of royalty, as in Fitzroy, Fitzjames, and Fitzclarence. The Russian termination *witch* or *vitch* is a disguised form of the same word.

FITZGERALD, *fĭts-jĕr'ald*, Edward, Lord: 1763, Oct. 15—1798, June 4; b. near Dublin: Irish patriot. He was younger son of the first Duke of Leinster. In 1779 he entered the army, and two years later accompanied Lord Rawdon to America as aide-de-camp. In the war of the revolution he distinguished himself by personal bravery, strategic skill, and humane instincts. He was wounded at Eutaw Springs, and, after Cornwallis's surrender at Yorktown, was transferred to the staff of Gen. O'Hara, with whom he served at St. Lucia. In 1783, he returned to Ireland and was elected member of the Irish parliament for Athy. In 1796 he joined the party of 'United Irishmen', became pres. of the organization, was sent to France to negotiate a treaty with the Directory for a French invasion of Ireland, was captured and died in prison.

FITZ GERALD, James N.: an American clergyman; b. 1837, July 27; d. Hong Kong, 1907, April 3. He was admitted to the bar, 1858. He united with the Meth. Epis. church, 1861, and in the following year joined the Newark Conference. For 18 years he was pastor and presiding elder in that conference, of which he was also secretary for 10 years. In 1888 he became a bishop, and in 1897 was elected president of the Ocean Grove Camp Meeting Association.

FITZGERALD, Joseph, author, editor, and encyclopedist: b. Limerick, Ireland, 1837, Jan. 6. He graduated

from Mount St. Mary's College, Emmittsburg, Md., 1856; was assistant editor of the *Popular Science Monthly*, 1872–79; publisher-editor of the *Humboldt Library of Science* 1879–89; later assistant editor of the *North American Review*, and then of *The Forum* for a period of four years, also editor of the *Twentieth Century* for one year. He was a contributor to the *United Editors Encyclopedia*, the *Encyclopedia Americana*, and the *Dictionary Encyclopedia*, and is author of, *Caseine: being Rural Meditations* (1869); *Word and Phrase—True and False Use in English* (1901). He has translated a number of scientific works from the French and German.

FITZGERALD, Oscar Penn: an American clergyman; b. 1829, Aug. 24; received a common school education in North Carolina, his native state. He then entered a printing office in Virginia, but later abandoned that business and went to Georgia, where he became a minister in 1853. Two years later he removed to California. He was for some time editor of the *Pacific Methodist and Christian Spectator*. In 1867–71 he held the post of superintendent of public instruction of California, and was ex-officio editor of the *California School Journal*. In 1878 he was elected editor of the *Nashville Christian Advocate;* became bishop of the Meth. Epis. Church, South, 1890. He wrote *California Sketches; A Life Study; Eminent Methodists; Judge Longstreet*, etc.

FITZGERALD, Thomas, Lord: abt. 1514—1536, Feb. 3; b. Kildare: Irish revolutionist. He was son of Gerald, 9th earl of Kildare and lord deputy of Ireland, accompanied his father when summoned to London to answer charges of official maladministration 1534, and, after his father's committal to the Tower, was sent back to Ireland as vice-deputy, and with secret instructions to foment rebellion against the king of England. He gathered a large body of daring men around him, took possession of the city of Dublin, and laid siege to the castle, to which the English govt. had fled for safety. At this juncture the primate, Abp. Allen, who had been charged specially by Henry VIII. to watch and report events, undertook to sail for England; but the vessel ran aground and the abp., his chaplains, and attendants were seized by Fitzgerald and murdered. While still besieging Dublin castle, his domains were invaded by the Earl of Ormond, and to protect them he had to abandon the siege. He sought in vain to seduce Ormond from his allegiance, took a treacherous advantage of him under a truce, and finding the gates of Dublin shut against him on his return, laid siege to the city. In Oct. Ormond again invaded Kildare, and Fitzgerald raised the siege to attack him, but, while on the march, an English army was landed at Dublin, and Fitzgerald retired to the country. Soon afterward he made a dash toward Dublin and burnt two villages near by. In 1535, Mar., Skeffington, the new deputy, attacked the castle of Maynooth, the principal strong-

hold of the revolutionists, when Fitzgerald retreated into Thormond, whence he purposed journeying to Spain to plead in person with the emperor for assistance. He changed his mind, however, and wandered about the country till a price was set on his head, when he surrendered unconditionally, was taken to England, and, with his five uncles, committed to the Tower and hung for treason at Tyburn. His father died in the Tower after hearing of his son's rebellion and excommunication, but Thomas did not assume the title.

FITZHERBERT, *fĭts-hėr'bėrt*, MARIA: married to the Prince of Wales, afterward George IV.: 1756, July—1837, Mar. 29; daughter of Walter Smythe, of Bambridge, Hampshire. She married first Edward Weld of Dorset, and, after his death, Thomas Fitzherbert of Stafford (d. 1781). In 1785, Dec., she was married to the Prince of Wales in private by a regular clergyman of the Church of England; but the union was legally invalid because of the statute prohibiting marriage between a prince of the royal blood and a subject. George afterward married the Princess Caroline of Brunswick, and, on his separation from her, lived with Mrs. Fitzherbert till his excesses forced her to leave him. She retired to Brighton and received a govt. pension till death.

FITZSIMMONS, *fĭts-sĭm'onz*, THOMAS: 1741–1811, Aug.; b. Ireland: merchant. He settled in Philadelphia and engaged in mercantile business, raised a company of volunteers and commanded it during the revolutionary war, joined his partners in subscribing $25,000 for army supplies 1780, was several times a member of the Penn. assembly, delegate to the continental congress 1782–3, and to the constitutional convention 1787, member of congress 1789–95, and pres. of the chamber of commerce of Philadelphia, and of the N. American insurance company.

FIUME, *fē-ô'mā* (in the Illyrian language, *Reka* or *Rika;* Latin, *Fanum St. Viti ad flumen*): important seaport of Austria, at the efflux of the Fiumara into the Gulf of Quarnero, in the Adriatic; 40 m. s.e. of Trieste, across the Istrian peninsula; lat. 45° 20′ n., and long. 14° 26′ e. Fiume has quite the character of a German town, is adorned with many handsome buildings, and consists of an old and new town, which together contain (1890) 30,337 inhabitants. It has manufactures of tobacco, paper, ropes, Whitehead torpedoes, and a flourishing trade in shipbuilding. Fiume has a fine quay, with a light-house, and its commerce is of late increasing. It has been a free port since 1722; and in 1849 was severed from Hungary with the territory to which it belongs, but since 1870 is again under the Hungarian administration.

FIVE, a. n. *fīv* [Icel. *fimm;* Goth. *fimf;* Ger. *fünf;* Dut. *vijf;* L. *quinque;* Gr. *pente*, five: Skr. *panchan*, five —from *pâni*, a hand: Pers. *pendji*, five—from *pentcha*, hand]: four and one. FIVE-FINGER, in *bot.*, *Potentilla reptans;* cinquefoil. FIVE-FINGERS, n. in *zool.*, name given

by oyster-fishers to two species of star-fish, *Uraster rubens*, and *Solaster papposus;* in *cards*, name given to the five of trumps. FIVE-FOLD, a. ad. five times repeated. FIVE-POINTS, n. the five leading tenets of Arminianism: see ARMINIUS; the five leading tenets of Calvinism (q.v.). FIVER, n. *fī'vėr, familiarly*, anything which counts by fives, generally said of a five-pound note. FIVES, n. plu. *fīvz*, a game like tennis (see below).

FIVE FORKS, BATTLE OF: 1865, April 1. 11 miles southwest of Petersburg, Va., between a Union force of about 23,000, under Gen. Sheridan, and a smaller Confederate force under Gen. Pickett, in which, after a hard contest, the Confederates were utterly routed with a loss of 5,000 prisoners, 6 guns and 11 colors. The number of Confederate killed and wounded is not known. The Union loss was 830 killed and wounded. It was one of the decisive battles of the war, and resulted in the abandonment of Petersburg and Richmond, followed 8 days later by the surrender at Appomattox.

FIVE HUNDRED, COUNCIL OF: one of two councils in France, instituted by the constitution adopted 1795, Sep. 23. It was composed of 500 members, and only such were eligible as had been residents in the country 10 years, and were at least 25 years old (30 years after 1798). One-third the members were chosen annually. The duty of the council was to propose laws. 42 of its members were expelled in 1796, but it thrived under the Jacobins, and was forcibly dissolved by Napoleon 1799.

FIVE MILE ACT: see CONGREGATIONALISM.

FIVES, n. plu. *fīvz:* an *OE.* spelling for VIVES, which see.

FIVES, *fīvz:* popular game in England, especially with schoolboys, and, in certain barracks where there is a 'court,' with soldiers. The game existed at a very early period—14th c.—both in France and England, being termed 'palm-play' in the former, and 'hand-tennis' in the latter; its present name is derived from its being played usually by five on each side. The method of play is very simple: A good roomy court is requisite, bounded by a high wall at one end, and against this wall a ball is propelled by striking it with the open hand. The players arrange themselves either five against five, as is usually the case, or in fewer numbers, and begin the game by one member striking the ball against the wall, and causing it to rebound anywhere beyond the floor-score, which is about two yards from the wall; one of the opposite party then strikes the ball as it rebounds, and, if it does not touch the wall higher than three ft. from the ground, his stroke goes for nothing, and the opposite party score one. The ball may be struck either from a direct rebound before it reaches the ground, or after it has 'dapped' or hopped from the ground once. 15 is usually game.

FIX, v. *fĭks* [F. *fixe*—from L. *fixus*, fixed, fastened: It.

fisso]: to attach firmly; to fasten; to direct steadily, as the attention; to make immovable; to settle; to appoint; to establish; to become firm or solid. FIX'ING, imp., in *photog.* (see below). FIXED, pp. *fĭkst*, stable; firm; intently directed; not volatile. FIX'EDLY, ad. *-ĕd-lĭ*. FIX'EDNESS, n. also FIXITY, n. *fĭks'ĭ-tĭ* [F. *fixité*]: coherence of parts; stability; firmness. IN A FIX, in a difficulty. FIXA'TION, n. *-ā'shŭn* [F.—L.]: the act of fixing; stability; in *photog.* (see FIXING). FIXTURE, n. *fĭks'tūr*, any permanent article of furniture; that which is permanently attached; in *law* (see below). FIXURE, n. *fĭk'shûr*, in *OE.*, stable state; firmness; position; pressure; FIXED AIR, carbonic acid gas or carbon dioxide (see CARBONIC ACID), so named by Dr. Black, the first to observe that the solid substance, carbonate of magnesia ($MgCO_3$), could, when heated, evolve carbonic acid gas (CO_2), proving that the latter was a *fixed air* while in union with the magnesia. FIXED ALKALIES, potash and soda, as distinguished from ammonia, which is a volatile alkali. FIXED BODIES, in *chemistry*, those substances which remain fixed, and are not volatilized at moderately high temperatures. FIXED OILS, those which do not readily dry, retaining their oily character; those which on the application of heat, do not volatilize without decomposition: see OILS. FIXED STARS, the stars which retain their relative positions in the heavens, not moving as the planets do (see STARS).—SYN. of 'fix, v.'; to determine; arrange; prepare; adjust; place; implant; pierce; transfix.

FIXED IDEA: is somewhat similar in meaning to delusion, monomania and imperative idea. It denotes an opinion or belief which can not be altered by argument nor by an appeal to observable facts and which is so dominating that it colors nearly all of the subject's mental activity. The mind naturally tends to become absorbed in or dominated by certain ideas, as is illustrated by prejudices, fads and persistent interests. Fixed ideas represent an abnormal development of this tendency, wherein the mental state is no longer subject to voluntary control. The condition is very common in insanity.

FIXING, *fĭks'ĭng*, in Photography: removal from a picture of the unaltered sensitive material. When a picture has been obtained through the agency of light, by the exposure of a sensitive surface suitably prepared and the subsequent development of the latent image, there remains in the deepest shadows of the picture a portion of the sensitive material unacted upon by light. The removal of this by an appropriate solvent is termed fixing, though the term *clearing* would perhaps be preferable, fixing being more strictly accurate in the case of the Daguerreotype (q.v.) process, where the picture is literally *fixed* to the silver-plate by the deposition of a film of metallic gold, of extreme tenuity, from a boiling hot solution of Sel d'or (q.v.). For particulars of failures arising from imperfect fixation or clearing, see PHOTOGRAPHY.

FIXTURES, in Law: primarily, a chattel or article of a

personal nature affixed to, or permanently used in connection with, land or premises. Originally, fixtures were articles which could not be removed from land, but at the present day fixtures may be defined as articles which, having been annexed to land or premises, may be afterward severed and removed by the party who has annexed them, or by his personal representatives against the will of the owner of the freehold. (Tyler, *Fixtures*, 35.) Thus, it is seen that fixtures in the law denotes in general the reverse of the name. Under the English common law, every thing affixed to the freehold became a part thereof and was subjected to the law governing the freehold. The growth of trade and commerce, and the increasing importance of personal property made it necessary to relax this strict rule. Exceptions were gradually made in favor of erections put up by tenants or for manufacturing, trading, and agricultural purposes. Finally, domestic furniture, decorations, and ornaments were permitted to be removed. In respect to the method of annexation, it may be said, that in order to make articles, originally personal, a part of the land or premises, and thus prevent their removal, they must either be fastened to the realty or to what is clearly a part of it, or must be placed upon the land with the manifest intent that they shall permanently remain there, and should be in some way peculiarly fitted to something that is actually fastened upon it if not absolutely necessary to its profitable use. (Tyler, *Fixtures*, 60.) As determining the right of removal, are to be considered: The nature of the thing affixed; the situation of the party claiming to exercise the right; whether as tenant, heir, vendee, mortgagee, etc.; the intention in making the annexation, the effect of custom, and the probable injury to be suffered by the removal. The fundamental point, however, is the intent with which the fixture has been erected, for, as a general rule, if the purpose was merely to benefit the land in general, the fixtures will become a part of the land, but if put up for trade, agriculture or for the personal convenience of the party, it may be removed. Such cases must, however, be distinguished from the wrongful annexation to land by mere strangers, to whom no right of removal is given. In relation to the time when fixtures should be removed, as between landlord and tenant, the tenant is required to exercise his privilege during his term, unless a different agreement has been made by the parties.

FIZZ, v. *fĭz* [a word imitative of the sound]: to make a hissing sound. Fiz'zing, imp. Fizzed, pp. *fĭzd*. Fizzle, v. *fĭz'l*, to make a hissing sound; to fizz; to fail of success. Fizzling, imp. *fĭz'lĭng*. Fizzled, pp. *fĭz'ld*.

FJORD: see Fiord.

FLABBY, a. *flăb'bĭ* [imitative of the sound produced by the *flapping* of a loose broad surface, which is represented by the syllables *flab*, *flap*, *flag*, *flack*, and suchlike: Dut. *flabberen*, to flap, to flutter: prov. F. *flappe*, faded, soft]:

unnaturally soft; hanging loose by its own weight. FLAB'BILY, ad. *-lĭ*. FLAB'BINESS, n.

FLABELLATE, a. *flă-bĕl'lāt*, or FLABEL'LIFORM, a. *-lĭ-fawrm* [L. *flabellum*, a fan; *forma*, shape]: in *bot.*, shaped, and sometimes plaited, like a fan.

FLABELLUM, n. *fla-bĕl'ŭm* [L. a small fan or fly-flap]: in *eccles.* and *chh. hist.*, an ecclesiastical fan, formed in Rome of peacocks' feathers, and, in other Obediences, of metal; anciently used to drive away flies and other insects from the chalice during the Sacred Mysteries. The Greeks and Armenians are the only Christians who make use of the flabellum: PLU. two fans of peacocks' feathers, borne before the Pope on solemn festivals; in *zool. and paleon.*, genus of actinozoa, family *Turbinolidæ*. It has existed from Eocene times till now.

FLACCID, a. *flăk'sĭd* [OF. *flaccide*, weak—from L. *flaccĭdus;* It. *flaccido*, flabby: F. *flaque;* Bret. *flak*, weak, drooping: Ger. *flacken*, to flicker (see FLABBY)]: not stiff; soft and weak; wanting in stiffness. FLAC'CIDLY, ad. *-lĭ*. FLACCID'ITY, n. *-sĭd'ĭ-tĭ*, or FLAC'CIDNESS, n. want of firmness or stiffness.

FLACCUS, *flăk'ŭs*, C. VALERIUS: Roman poet, of the 1st c.: supposed to have died 88. Absolutely nothing is known regarding his life. He is the author of an epic poem on the Argonautic expedition, which in its extant form is incomplete. Some modern critics, Wagner among others, praise it extravagantly, and place the author next to Virgil; but the more general opinion of sound scholars is, that the work is a specimen rather of learned mediocrity than a genuine inspiration. The *editio princeps* of the *Argonautica* appeared 1472. Of modern editions, may be mentioned those of Wagner (Gött. 1805) and Lemaire (Paris 1824). An English metrical translation was published by one Nicholas Whyte as early as 1565. Similar translations exist in French, Italian, and German.

FLACIUS, *flā'shĭ-ŭs*, MATTHIAS: 1520, Mar. 21—1575, Mar. 11; b. Albona, Venetian Illyria: Lutheran theologian. He was dissuaded from becoming a monk, went to Bâle to study theology and Luther's writings 1539, taught privately at Tübingen 1540, removed to Wittenberg 1541, became prof. of Hebrew in the univ. there 1544, was forced to leave the city by the Schmalcald war 1547, resided some time in Magdeburg, and held a professorship in the Univ. of Jena, from which he was dismissed for opposing the state restrictions on the church 1561. He wrote the *Magdeburg Centuries; The Catalogus testium Veritatis* (1556); the *Missa Latina* (1557); the *Clavis Scripturæ Sacræ* (1567); and *Glossa on the New Testament.*

FLACOURTIACEÆ, *fla-kōrt-ĭ-ā'sē-ē:* natural order of exogenous plants, allied to Passion-flowers, consisting of shrubs and small trees, almost exclusively confined to the warmest parts of the globe. Many of the species, particularly of the genus *Flacourtia*, produce pleasant, sweet,

or subacid fruits. *Flacourtia inermis* is much esteemed and cultivated in the Moluccas. Arnotto (q.v.) is produced by a tree of this order.

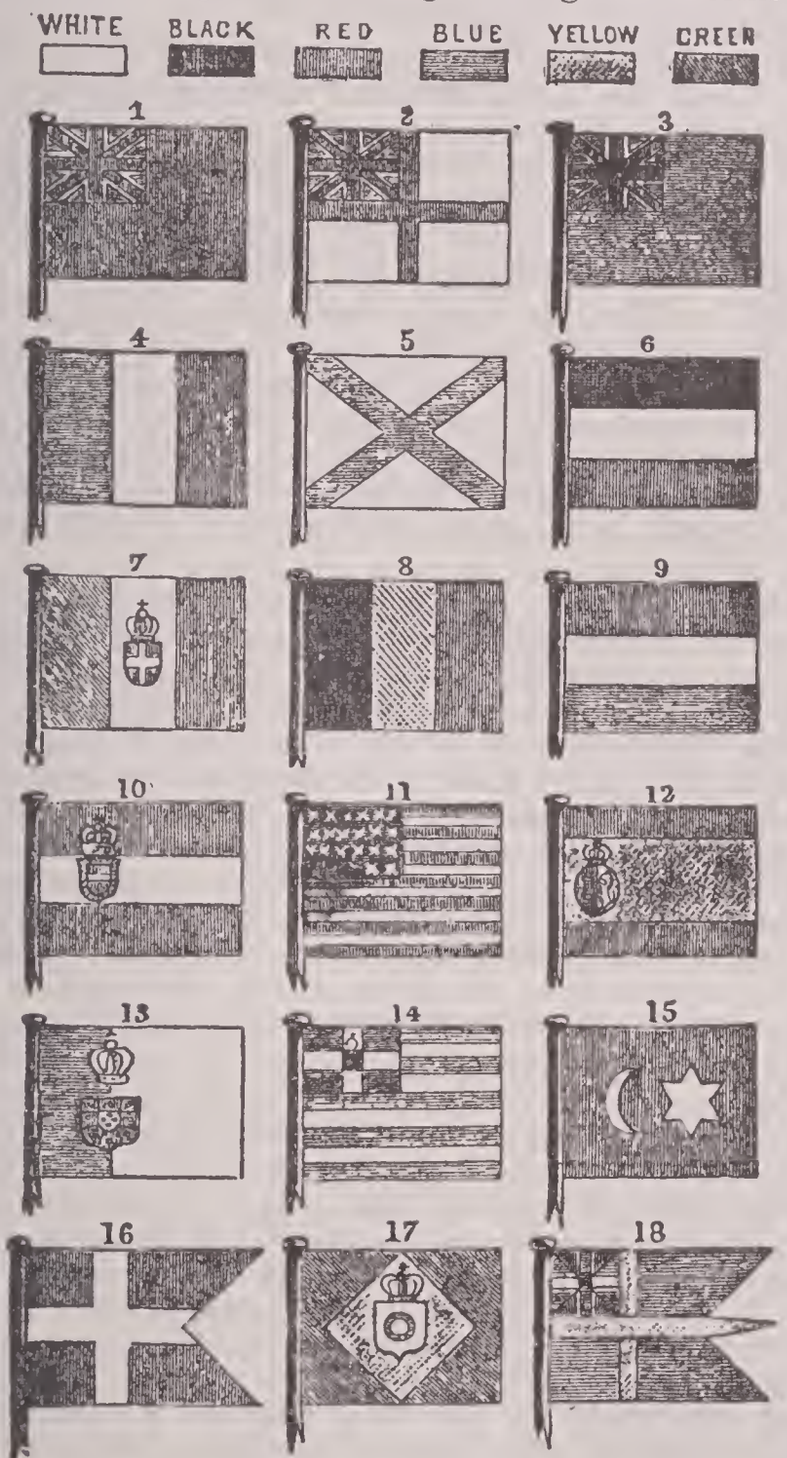
FLAG, n. *flăg* [Dan. *flag;* Dut. *vlag;* Ger. *flagge,* a flag: Dut. *flaggeren,* to flag, to hang loose; F. *flague;* Bret. *flak,* flaggy, drooping: prov. Sw. *flage,* to flutter in the wind, as clothes (see FLABBY)]: a piece of cloth, white or in colors, on which may be wrought some device, usually set upon a staff to wave in the wind; the ensign or colors of a regiment, ship, etc. (see below): V. to hang loose and flabby; to grow spiritless or dejected; to lose vigor; to droop. FLAG'GING, imp.: ADJ. languishing; having a tendency to weariness or faintness. FLAGGED. pp. *flăgd.* FLAGGY, a. *flăg'gĭ,* weak; not stiff. FLAG'GINGLY, ad. *-lĭ.* FLAG'GINESS, n. want of tension. FLAG-CAPTAIN, in the *navy,* the captain of the admiral's ship in any squadron, and ordinarily his nominee. FLAG-FEATHER, feather of a bird's wing next to the body FLAG-LIEUTENANT, in the *navy,* officer who performs such duties for an admiral as would devolve upon an aide-de-camp in the army: he communicates the admiral's orders to the various ships, either personally or by signal. FLAG-OFFICER, in the *navy,* an admiral, vice-admiral, or rear-admiral. He is so called from his right to carry, at the mast-head of the ship in which he sails, a flag denoting his rank. For an admiral, the flag is borne at the main; for a vice-admiral, at the fore; and for a rear-admiral, at the mizzen: see ADMIRAL. FLAG-SHIP, the ship in a fleet which bears the flag of the superior officer, as the admiral, and therefore forms a sort of centre to which all other vessels must look for orders; usually the largest vessel in the fleet. FLAG-STAFF, the pole or staff on which the flag is fastened. BLACK FLAG, flag of a dark color displayed to intimate to an enemy that no mercy will be given; the pirate's flag. FLAG OF TRUCE, white flag displayed to an enemy to invite to a conference, or to make some request or communication not hostile. RED FLAG, flag of a red color displayed as a signal of danger, or as a token of defiance. NATIONAL FLAG, flag of a particular country, on which some national emblem or device is emblazoned; representing the dominion and power of the nation (see FLAG, below). TO HANG THE FLAG HALF-MAST HIGH, to raise a flag only half-way up the mast or flag-staff as a token or sign of mourning. TO STRIKE OR LOWER THE FLAG, to lower it from the top in token or respect, or of surrender to an enemy.

FLAG: a cloth of light material, white or in colors, to

1, the Square Flag; 2, the Pennant; 3, the Burgee.

be hung high or carried, designed to make known to spectators some fact or event. The flag, in the army, is the en-

sign carried as its distinguishing mark by each regiment; also a small banner, with which the ground to be occupied is marked out. In the *navy*, the flag is of more importance, often constituting the only means vessels have of communicating with each other, or with the shore. For this purposes, devices of conspicuous colors (usually black, white, red, yellow, or blue) are hoisted at the masthead or at the gaff. The flags having three forms—viz.,



Flags of the Principal Maritime Nations:

1, Britain, red ensign; 2, Britain, white ensign; 3, Britain, blue ensign; 4, France; 5, Russia; 6, Germany; 7, Italy; 8, Belgium; 9, Holland; 10, Austro-Hungary; 11, United States; 12, Spain; 13, Portugal; 14, Greece; 15, Turkey; 16, Denmark; 17, Brazil; 18, Sweden.

a very few patterns in each shape give sufficient combinations of three or four flags to express any letter or word in the language. The flag is also a sign of the rank of the principal person on board a vessel; as, on British ships, the 'Royal Standard,' containing the arms of the United Kingdom, hoisted only when a member of the royal family is on board; the Anchor of Hope, on a red ground, denoting the Admiralty. The pennant specifies the ship-of-war; and the ensign denotes the nation.

The ensigns borne by ships-of-war of the leading states of the world are as shown below (in these diagrams, the direction of the lines shows the color as in heraldry), viz.: A white flag is accepted throughout the world as a token of peace; a red flag, as defiance; and a black flag denotes a pirate; a flag of plain yellow usually signifies that the vessel bearing it is in quarantine. See UNION JACK.

FLAG, n. *flăg* [Dan. *flæg,* a marsh-plant; *flagre,* to wave to and fro as flame]: popular name for many endogenous plants with large-bladed or sword-shaped leaves, growing mostly in moist situations. It is sometimes particularly appropriated to the species of *Iris* (q.v.), or Flower-de-luce; but is given also very indiscriminately to other plants of similar foliage, as the *Acorus calamus* (see ACORUS), called Sweet Flag.

FLAG, n. *flăg* [Sw. *flaga,* a crack or breach; prov. Dan. *flag,* a turf peeled off from the surface: Icel. *flaga,* to cut turfs; *flis,* a splinter]: a broad flat stone used for pavements: V. to lay with broad flat stones. FLAGGING, imp. *flăg'gĭng:* N. the act of laying with broad flat stones; a side walk of large flat stones. FLAGSTONE, n. a rock which splits into tabular masses, or flags of various size and thickness, in the original planes of stratification. Flagstones are generally sandstones, combined with argillaceous or calcareous matter; some, however, are indurated clays, and others thin-bedded limestones. They are used for paving, cisterns, etc. FLAG'GY, a. *-gĭ,* arranged in thin layers as a stone; capable of being split into flagstones.

FLAG, THE AMERICAN. The colonies used the English flag, bearing first the red cross of St. George; after the union with Scotland in 1707, the 'union' of St. George and St. Andrew; the present union jack, with St. Patrick's added, dates only from 1801. It was the former which Endicott cut from the flag as a popish symbol; Massachusetts petitioned for red and white roses in their place, but the military commissioners simply left out the cross and substituted the king's arms. Militia companies had sometimes their own flags. In 1686 Andros had a special one made for the New England Union. From 1700 to 1750 the New England flags were 'a red or blue ensign cantoned white, with a red St. George's Cross, and having a tree or globe in upper corner of the canton' (Preble); the tree is usually assumed as a pine, like that on the coins, but in neither case with any evidence. The colonial merchant ships, to distinguish them from the mother

country's, had a white escutcheon in the middle of the jack. The first outbreak of special flags was at the time of the Stamp Act, when each gathering usually improvised a flag. But the 'union flags' of the early Revolution times and just before seem to have been the English union jack with patriotic mottoes: the colonies kept up the theory that they were loyal subjects of England. What flag or flags, if any, were used at Bunker Hill is uncertain, as the British captured none, and the reminiscences are inconsistent. Most probably each detachment had its own and carried it off.

In the early part of the Revolutionary War there was no attempt at a national flag, each colony or even troop or privateer pleasing itself. Some of the famous ones—as Col. William Washington's at Eutaw Springs, a piece of crimson damask cut by his fiancée from her upholstered chair—were private. The public ones were mainly of two sorts. The new England type had a tree (officially made a pine) in green on a white ground, and 'An Appeal to Heaven' or the Connecticut 'Qui Transtulit Sustinet' as a legend; in one case, a pine and a field of Indian corn, with two wounded officers and several children, and the motto, 'For posterity we bleed.' One of greater national significance was the rattlesnake type; at first cut into 13 pieces, with the initial of a colony on each, and the legend 'Join, or Die'; then coiled to strike, with the legend 'Don't Tread on Me'; later, 13 stripes with the snake across them. In either case, there were generally 13 rattles. Another flag was white, with a mailed hand grasping 13 arrows; still another, a female figure with a staff from which streamed 13 pennants. The first in the South was said to be devised by Col. Moultrie, in the fall of 1775—a large blue flag with a crescent in the right upper corner, and 'Liberty' in the centre; this was the one used in the defense of Port Moultrie, and which Sergt. Jasper picked up under the British fire.

The national flag had no single or definite origin. After a few months of war it was seen to be needful, but the reluctance to break with the English pattern confirms the sincerity of the protestations of continued loyalty; and in December 1775 a committee consisting of Franklin, Thomas Lynch, and Benjamin Harrison recommended, and Congress adopted, the British union plus 13 stripes, which was hoisted over the headquarters at Cambridge 1776, Jan. 1 or 2. The origin of the stripes is so utterly unagreed that it is probable any one of several things may have suggested it: their use on the Dutch East India Company's flags; those on the escutcheon of the Washington family; or simply the stripe which was the one distinguishing feature of the army uniform. Paul Jones claims to have been the first to raise the national flag, late in December 1775, but it seems to have been one of the rattlesnake type; that, however, was the kind selected by the Congressional naval committee on 1776, Feb. 8. In June 1776 it was unofficially decided by Congress and Washington, in view of the im-

pending Declaration, to replace the union by a five-pointed star; but the first official adoption of a flag was in 1777, June 14, displacing the union by 13 stars, 'a new constellation,' and using just 13 stripes. The first use of the new flag is disputed; it seems to have been improvised and run up over captured British standards at Fort Stanwix 1777, Aug. 8, after the battle of Oriskany, but a regular flag was made and carried at the battle of Brandywine, September 11. Historical paintings are full of anachronisms as to flags. The stars were generally in a circle. The first change was the addition of two new stripes and two new stars for Vermont and Kentucky, in 1794; and though Ohio and Louisiana came in, no further alteration was made for nearly a quarter of a century. The stars were generally in three lines of fives. Finally, in 1818, April 4, it was ordered that the 15 stripes be reduced permanently to 13, in memory of the original colonies, and the stars keep pace with the total number of States, on the 4th of July after each admission. The arrangement of the stars was not specified, and has been at the taste of the makers. The revenue flag has 13 blue stars on a white ground, as a union, with 16 perpendicular red and white stripes; it indicates the authority of the Treasury Department. The secretary of war, the secretary of the navy, and the President have each their flags; the latter carried at the main of naval vessels and on boats he is in. Each of the flag-officers has his own flag. The union jack, white stars on a blue ground, is used by pilots, and at the bow of ambassadors' and ministers' boats.

The Confederate States had their own flags. But at the outset of the War their Congress adopted the 'Stars and Bars'—having a white stripe between two red ones, and a blue union with seven white stars in a circle, for the number of seceding States. Later the stars were increased to 13. The usual battle-flag was red, with a blue cross and white stars diagonally. Late in the War, the 'bars' were exchanged for a white ground next the staff and red outside; and it was sometimes made black. Consult: Preble, *History of the Flag* (1872).

FLAGELLANTS, *flăj'ĕl-lants:* certain bodies of fanatical enthusiasts, who, at intervals from the 13th to the 16th c., made their appearance in different countries of Europe, proclaiming the wrath of God against the corruption of the times, inviting sinners to atone for sin by self-inflicted scourgings or flagellations, and themselves publicly enforcing this exhortation by voluntary scourging of themselves, and by other forms of self-castigation. In large and disorderly bands—frequently headed by priests, and by fanatics in the costume of priests and monks, bearing banners and crucifixes aloft, their breast and shoulders bare, and their faces concealed by a hood or mask, each armed with a heavy knotted scourge, loaded with lead or iron—they marched from town to town, chanting hymns full of denunciations of vengeance and of woe. In the most public place of each town which they entered, they threw them-

selves upon the earth, with their arms extended in the form of a cross, and there inflicted upon themselves the discipline of scourging, frequently to blood, and even to mutilation. Each member enrolled himself for 33 days, in honor of the 33 years of the life of our Lord on earth; and all for the time professed entire poverty, subsisting only on alms or voluntary offerings. These fanatical movements, the religious revivals of those days darkened by ignorance and superstition, recurred at frequent intervals. The most remarkable, however, are three in number. The first originated at Perugia 1260, when society in Italy was greatly disorganized by the long continued struggles of the Guelph and Ghibelline factions. The very disorders of the time prepared the way for this religious reaction. Numbers crowded to follow the new cry, until at last the body became so formidable as to draw upon itself the suspicions of Manfred, son of Frederic II., by whom it was vigorously suppressed. Later offshoots of the party made their appearance in Bavaria, Austria, Moravia, Bohemia, Poland, and France; when to their extravagant practices, they added still greater extravagances of doctrine. In virtue of a pretended revelation, they asserted that the blood shed in self-flagellation had a share with the blood of our Lord in atoning for sin; they mutually confessed and absolved each other, and declared their voluntary penances to be a substitute for all the sacraments of the church, and for all the ministrations of the clergy. The Jews were to them an object of special abhorence; and this unforunate race, exposed at all times to every caprice of the popular will, suffered dreadfully from the fury of the Flagellants in many of the towns of Germany and the Netherlands. In the second outbreak of Flagellantism about 1349, the outrages against public decency were much more flagrant than at its first appearance. Men and women indiscriminately now appeared in public half naked, and ostentatiously underwent these self-inflicted scourgings. The immediate occasion of this new outburst of fanaticism, was the terror which prevaded society during the dreadful plague known as the Black Death, which Hecker, in his *Epidemics of the Middle Ages*, describes with terrible fidelity. The same extravagances were repeated in Upper Germany, the provinces of the Rhine, the Netherlands, Switzerland, Sweden, and even England. Although rigorously excluded from France, these fanatics effected an entrance into Avignon, then the residence of the popes, when they were condemned by a bull of Clement VI. The mania gradually subsided, nor is any permanent trace of it seen till the beginning of the next century. In 1414, a new troop of Flagellants, locally called *Flegler*, made their appearance in Thuringia and Lower Saxony, renewing and even exaggerating the wildest extravagances of their predecessors. These new fanatics appear to have rejected all the received religious usages, and indeed all external worship, placing their entire reliance on faith and 'flagellation.' Their leader was called Conrad Schmidt. They rejected not only the doctrines

of the church on the sacraments, but also purgatory and prayers for the dead. Schmidt pretended a divine mission; and proclaimed that the blood of flagellation was the true wedding-garment of the gospel; that it was more precious than the blood of the martyrs and a sure passport to eternal life. The violence of these fanatics drew upon them the severest punishments of the Inquisition. Many were capitally condemned, and Schmidt himself was burned at Sangerhausen 1414. Their doctrines, comprised in 50 articles, were condemned in the Council of Constance.

These strange extravagances are reprobated by the Rom. Cath. Church in common with all other Christian communities; but Rom. Catholics (relying on I. Cor. ix. 27; Coloss. iii. 5) hold the lawfulness, and even the meritorious character, of voluntary self-chastisement, if undertaken with due dispositions, practiced without ostentation or fanaticism, and animated by a lively faith and a firm hope in the merits of Christ. This is the self-castigation known under the name of 'the Discipline'—a form of mortification not unfrequent in the monastic state, and even practiced by lay persons, and these sometimes of the highest rank, both in ancient and in modern times. Compare Förstemann's *Die Christlichen Geisslergesellschaften*, Wadding's *Annales Minorum Fratrum*, Raynaldi's *Continuation of Baronius*, Mosheim's *Church History* (Soames' ed.), Gieseler's *Kirchengeschichte*, and Milman's *Latin Christianity*.

FLAGELLARIA, n. *flăj-ĕl-lär′ĭ-a* [L. *flagellum*, in allusion to the long, flexible branches]: in *bot.*, genus of *Commelynaceæ*, or, according to some botanists, of *Juncaceæ*. The leaves of *F. indica* are said to be astringent and vulnerary.

FLAGELLATA, n. *flă-jĕl-lā′ta* [L. *flagellum*]: in *zool.*, an order of infusoria furnished with flagella, which are often accompanied by cilia. Both are used as organs of locomotion.

FLAGELLATE, v. *flăj′ĕl-lāt* [L. *flăgĕllātus*, flogged, scourged: It. *flagellare:* F. *flageller*]: to whip; to scourge. Adj. having a long lash-like appendage. Flag′ellating, imp. Flag′ellated, pp. Flag′ella′tion, n. *-lā′shŭn* [F.—L.]: a flogging. Flag′ellant, n. [F.—L.]: one who flogs himself (see below). Flagelliform, a. *flă-jĕl′lĭ-fawrm* [L. *flagellum*, a whip; *forma*, shape]: in *bot.*, flexible, narrow, and tapering, like the thong of a whip. Flagel′lum, n. *-lŭm* [L.]: in *bot.*, a weak, creeping stem, bearing rooting buds at different points, as in the strawberry (see Scape); the lash-like appendage exhibited by many infusoria; the divided limb of each of the antennæ of an insect.

FLAGEOLET, n. *flăj′ŏ-lĕt* [F. *flageolet*—from OF. *flagoler*, to pipe: Prov. *flageol*, a pipe]: wind instrument with a mouth-piece like that of the common-whistle. It is of box-wood or ivory, in several pieces, and has holes for the fingers, like the flute. According to Burney, the flageolet was invented by Sieur Juvigny 1580. Flageolet-tones, the harmonic notes of the violin, violoncello, and other

stringed instruments, which notes are produced by the finger lightly touching the string on the exact part which generates the harmony, and not by pressing the string down to the finger-board. The string vibrates on both sides of the finger, the long side dividing itself into parts of the same length as the short side: see HARMONICS. The inventor of the manner of playing flageolet-tones is said to have been Domenico Ferrari. The best work on the subject is by Collinet.

FLAGITIOUS, a. *flă-jĭsh′ŭs* [L. *flagĭtĭōsŭs*, disgraceful —from *flagĭtō*, I demand hotly or fiercely: It. *flagizioso*]: grossly wicked; heinous; atrocious; villainous. FLAGI′TIOUSLY, ad. *-lĭ*. FLAGI′TIOUSNESS, n. wickedness; villainy —SYN. of 'flagitious:' flagrant; corrupt; profligate; abandoned; shameful; scandalous.

FLAG OF THE PROPHET (Sanjak-Sherif): the sacred banner of the Mohammedans; originally white, composed of the turban of the Koreish, captured by Mohammed. A black flag was, however, soon substituted in its place, consisting of the curtain that hung before the door of Ayeshah, one of the prophet's wives. This flag, regarded by the Mohammedans as their most sacred relic, first came into the possession of the followers of Omar at Damascus; it afterward fell into the hands of the Abbasi; then passed into those of the caliphs of Bagdad and Kahira; and, at a later period, was brought into Europe by Amurath III. It was covered with 42 wrappings of silk, deposited in a costly casket, and preserved in a chapel in the interior of the seraglio, where it is guarded by several emirs, with constant prayers. The banner unfolded at the commencement of a war, and likewise carefully preserved, is not the same, though it is commonly believed by the people to be so.

FLAGON, n. *flăg′ŏn* [F. *flacon*, a great leathern bottle— from mid. L. *flascōnem*]: a large drinking-vessel with a narrow mouth.

FLAGRANT, a. *flā′grănt* [F. *flagrant*—from L. *flāgrăntĕm*, burning with heat: It. *flagrante—lit.*, burning or glowing with heat]: ardent; glaring; notorious; very great. FLA′GRANTLY, ad. *-lĭ*. FLA′GRANCE, n. *-grăns*, or FLA′GRANCY, n. *-sĭ*, excess; enormity. FLAGRANTE BELLO, *flā-grăn′tē bĕllō* [L.]: with the war raging at the time. FLA′GRAN′TE DELIC′TO, *-dē-lĭk′tō* [L.]: in *law*, in the very act of committing a crime.—SYN. of 'flagrant'—see 'flagitious.'

FLAHAULT DE LA BILLARDERIE, *flâ-ō′ dĕh lâ bē-yâr-drē′*, AUGUSTE CHARLES JOSEPH, Comte DE: 1785, Apr. 20—1870; b. Paris: soldier and diplomatist. He was destined for the army by his father, a general officer; and when a mere lad, he crossed the Alps as a volunteer in a cavalry regiment with Napoleon. He was rapidly promoted to the rank of aide-de-camp of Napoleon. He distinguished himself in the Peninsular war and the Russian campaign; and, 1813, received the title of Count, and the rank of gen. of division in the new army. On the return

of Napoleon from Elba, he was one of those who recommended him to abdicate in favor of his son. He became an exile after Waterloo; and while in England, married a Scotch heiress, Lady Keith, a British peeress in her own right. His name was afterward removed from the list of exiles. After the revolution of 1830, F. returned to France and was restored to his rank in the army. He entered the household of the king, and was ambassador to Vienna, 1842–48. After the establishment of the second empire, Flahault was called to the senate; and 1860–62 was French ambassador to London. In 1864, he was named grand chancellor of the Legion of Honor. His daughter married the fourth Marquis of Lansdowne.

FLAIL, n. *flāl* [OF. *flael;* Ger. *flegel;* F. *flayau* and *fléau*, a flail, a scourge (see FLOG)]: a wooden instrument for beating out grain from the ear, consisting of two heavy rods tied loosely end on end.

FLAKE, n. *flāk* [Sw. *flaga*, a crack, a flaw; Bohem. *flak*, a good piece: Icel. *flak*, a plank, a slice—*lit.*, a piece stripped off]: a feathery piece of snow as it falls from the clouds; a thin feathery plate; any scaly matter in small layers; a rude flint instr. in the form of a splinter or small layer; a variety of the carnation having its colors distributed in flakes—the *Dĭănthus căryŏphyl'lus*. V. to form into flakes; to peel or scale off. FLA'KING, imp. FLAKED, pp. *flākt*. FLA'KY, a. *-kĭ*, consisting of flakes. FLA'KINESS, n. FLAKE-WHITE, oxide of bismuth occurring in small flakes; pure white-lead.

FLAM, n. *flăm* [Ger. *flammern*, to glitter, to sparkle]: a story without a foundation, invented to deceive or amuse; a falsehood; flattery for a purpose; blarney: see FLIM-FLAM.

FLAMANT: in *her.*, flaming, burning, blazing; as a torch, a firebrand, etc.

FLAMBEAU, n. *flăm'bō* [F.—from L. *flamma*, a flame]: a lighted torch. FLAM'BEAUX, n. plu. *flăm'bōz* or *-bō*.

FLAMBOROUGH HEAD, *flăm'bŭr-rō hĕd* (Saxon, *Fleamburgh*): promontory of the Yorkshire coast, England, and forming the n. boundary of Bridlington Bay. It terminates a range of white perpendicular chalk cliffs. 6 m. long, 300 to 450 ft. high. Its rugged sides contain many caverns, and in the sea near are many picturesque chalk rocks, which swarm with sea-birds. The chalk contains fossil sponges, crinoids, etc. On the Head is a lighthouse, 214 ft. high, visible 19 m. away. Across the peninsula, ending in the head, runs a ditch with two lines of defense and breast-works, called Dane's Dyke, but really ancient British work.

FLAMBOYANT, *flăm-boy'ant:* latest style of Gothic architecture which prevailed in France. Its date there was the 15th and part of the 16th c., and corresponds to the Perpendicular (q.v.) in England. The name is derived from the flame-like forms of the tracery of the win-

dows, panels, etc. (fig. 1). The characteristics of this style are minute and elaborate ornament, combined with general bareness of surface. The crockets, for instance, are generally cut into a great number of small leaves, while they are placed far apart; the mouldings are divided into large empty hollows and small thin fillets and beads; the finials have crockets minutely carved, set upon bare pyramidal terminals; the arch-moldings are divided into a great number of small parts, and lack the boldness and decision of the earlier styles. These moldings are frequently abutted on the pillars, or continued down them without any caps; and when there are caps, they are small and without effect. See fig. 2. When moldings join, they are frequently run through one another, so as

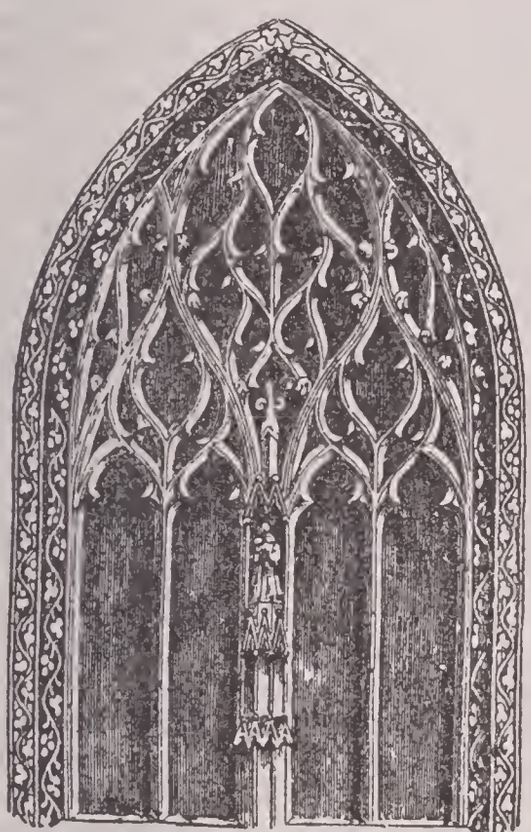


Fig. 1.—Window, Harfleur.

Fig. 2.

to appear to interlace. The effect is intricate rather than beautiful, suggestive, like the rest of the style, of ingenuity in stone cutting rather than of art. The doorways and windows are sometimes large and fine (as in fig. 1); but while these are highly enriched, the general surface of the building is left too plain. There are many large windows in France in this style, but usually portions only are fine, while the general effect is deficient. Some of the spires of this period are very beautiful: the n. spire of Chartres Cathedral, for example, is considered one of the finest in France.

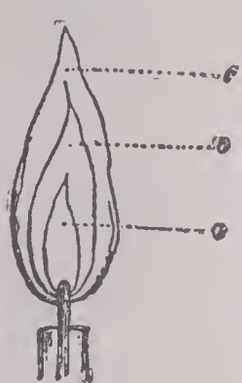
FLAME, n. *flām* [F. *flamme*, a flame, a streamer; *flamber*, to blaze—from L. *flamma*, a flame]: a blaze; fire in general; combustion of gas or vapor (see below): heat of passion; warmth of affection; love; violence; one be-

loved: V. to blaze; to burn as a gas; to break out into violence; in *OE.*, to inflame; to animate. Fla'ming, imp.: Adj. blazing; bright; luminous; captivating; attractive; N. a bursting out into flame. Flamed, pp. *flāmd.* Flame'less, a. destitute of flame. In a flame, intensely excited; thoroughly roused for action. Flame-bridge, wall rising from the floor of a furnace to cause the flame to impinge upon the bottom of the boiler. Flame colored, of a bright yellow color. Flame-engine, early name for the gas-engine, in which the piston is moved by the expansion due to the sudden combustion of a body of gas in the cylinder. Flame-lily, in *bot.*, the amyrillidaceous genus *Pyrolirion.* Flame-moth, *Anticlea rubidata.* Flame tree, in *bot.*, *Brachychiton acerifolium.* Fla'mingly, ad. *-lĭ.* Flamy, a. *-mĭ,* blazing; having the nature of flames. Flamen, n. *flā'mĕn* [akin to Gr. *phlego,* I set on fire]: the person who lights the sacrificial fires; a priest of anc. Rome, dedicated to the service of a particular divinity, and called by a distinctive name. There were 15 flamens in all: the chief (*Flamines Majores*) were the flamens of Jupiter, of Mars, and of Quirinus, who were always patricians; the remaining 12 (*Flamines Minores*) were chosen from the plebeians. The flamens were elected at first by the *Comitia Curiata,* but afterward by the *Comitia Tributa,* and were installed into their office by the supreme dignitary of the Roman pagan religion, the *Pontifex Maximus.* The flamen of Jupiter was a privileged person; and he was not required to take an oath, was attended by a lictor, his house was an asylum, and he had a seat in the senate. But all this was attended by numerous superstitious restrictions: he might not have a knot on any part of his attire, nor touch flour, or leaven, or leavened bread; he might not touch or name a dog, or mount a horse, or be a night out of the city, etc. His wife, called Flaminica, was subjected to similar restrictions, and when she died, the flamen was obliged to resign. The majority of Roman writers attribute the institution of flamens to Numa. *Note.*—A *flamen* is said by anc. L. authors to be so named from a *fīlum* or fillet of wool worn around the head or cap.—Syn. of 'flame, n.': (see Fire); blaze; brightness; ardor; fervency; excitement; lover; sweetheart.

FLAME: the particular form of combustion (q.v.) caused by the burning of a gas. Solid bodies which do not contain volatile constituents become incandescent when they burn, but their combustion is not attended by the development of actual flame. The flames that appear to issue from such solid combustibles as wood and coal are in reality due to the combustion of gases that are distilled from the fuel by intense heat. The heat and light of flame vary with the gas; hydrogen produces great heat but little light. The lighting power of a gas depends upon the proportion of carbon that it contains, the particles of which become incandescent before being consumed.

The flame of a lamp, candle, or simple gas jet consists

of a hollow cone burning only on the outside, where the oxygen of the air can mingle with the gases in sufficient quantities to support combustion. When a piece of wire gauze is brought down over the flame of a candle, the gauze allows the gases that arise from the wick to pass through it, but it chills them so that they are no longer capable of combining with one another, and hence the flame does not extend above the gauze. That the gases developed at the wick really do rise up through the gauze is proved by igniting them with a burning match. This dark portion of the flame may be called *the area of no combustion.* The luminous cone which envelops the dark space is *the area of partial combustion.* The oxygen of the atmosphere penetrates to this depth, but not in sufficient quantity to oxidize or burn both the carbon and the hydrogen; it therefore unites with the hydrogen, for which it has the stronger attraction, and leaves the carbon free. The outer cone is named *the area of complete combustion,* because there the carbon meets with sufficient oxygen to burn it entirely. The light is produced in the area of partial combustion; there the carbon is set free from the hydrogen in the form of solid particles, and is heated to whiteness by the combustion of the hydrogen. The combustion of the carbon in the outer cone, by which it is converted into carbonic acid gas, produces heat, but so little light as to be barely traceable. Flames may be colored, and often very brilliantly, by the presence within them of certain metallic salts. Sodium compounds produce a strong orange-yellow color, potassium a violet, and strontium a crimson. Advantage is taken of this fact for the production of color effects in pyrotechnic displays.



a, area of no combustion; *b*, area of partial combustion; *c*, area of complete combustion.

FLAMINGO, n. *flă-mĭng'gō* [Sp. *flamenco*, a flamingo—from Sp. *flama;* L. *flamma*, a flame], (*Phœnicopterus*): genus of birds which until recently was placed by all naturalists among the *Grallatores* (Waders), but is now generally ranked among the *Palmipedes*, and even referred to the family of *Anatidæ*. The bill is large, deeper than broad, and suddenly curved downward near the middle, so that, as the bird wades and seeks its food, either in the water or in the mud, it makes use of the bill in a reversed position, the upper mandible being lowest. The edges of both mandibles are furnished with small and very fine transverse laminæ, which serve, like those in the bills of ordinary *Anatidæ*, to prevent the escape of the small crustaceans, mollusks, worms, small fishes, seeds, etc., which are the flamingo's food, and to separate them from the mud with which they may be mingled. The upper surface of the tongue is also furnished on both sides and

at the base with numerous small flexible horny spines, directed backward. Unlike the ordinary *Anatidæ*, flamingoes have great part of the tibia, as well as the tarsus, naked, in this resembling all the Waders. They are birds of powerful wing, and fly either in strings or in wedge-shaped flocks like geese, a single bird leading the way for the flock. They seldom make use of their webbed feet for swimming, to which the length of their legs is not well adapted, the use of the membrane being rather to support them on soft muddy bottoms. When feeding they keep their feet in almost constant motion, as if to stir the mud. Hundreds may sometimes be seen feeding together in the shallow waters or salt marshes of tropical coasts, chiefly of Asia and Africa, or on the banks of rivers or inland lakes, and by their large size and rich colors making a brilliant spectacle. They make their nests in marshes, scraping together a heap of mud, on the top of which is the nest; and it is said that the long legs of the female flamingo often hang down into the water during the incubation, not being easily disposed of otherwise.—There are several species of flamingo, but very similar to each other, in appearance and habits. One species only visits the south of Europe, the Common Flamingo (*P. ruber*), a bird measuring fully four feet from the tip of the bill to that of the tail, and six feet from the tip of the bill to the claws; the male, when in full plumage, is of a red-rose color, with deep purple wings; the female, and the young for several years, are less brilliant, the young at first being whitish, and the red appearing first on the wings.—The AMERICAN FLAMINGO (*P. Americanus* or *Chilensis*) is of a more orange tint, and is abundant on many parts both of the e. and w. coasts of America.

FLAMINIAN WAY, *fla-mĭn'ĭ-an wā* (*Via Flaminia*): the great northern road of anc. Italy, leading from Rome to Ariminum (*Rimini*) on the Adriatic. It was constructed by C. Flaminius during his censorship (B.C.220), and was designed to secure a free communication with the recently conquered Gaulish territory. The Flaminian Way was one of the most celebrated and most frequented roads of Italy during the period both of the Republic and of the Empire. Its importance may be estimated from the fact, that when Augustus (B.C. 27) appointed persons of consular dignity road-surveyors for the other highways of his dominions, he reserved the care of the Flaminian Way for himself, and renewed it throughout its whole length. Its general direction was northerly. Leaving Rome, it kept for the most part at no great distance from the Tiber till it reached Narnia (*Narni*), where it struck off n.e., passing Interamna (*Terni*) and Spoletium (*Spoleto*), and reaching the foot of the Apennines, at Forum Flaminii. Crossing the central ridge of the Apennines, at Ad Ensem (La Schieggia?), it again proceeded in a northerly direction, pursuing much the same line of route as the modern road from Foligno to Fano, and reached the Adriatic at Fanum Fortunæ (Fano),

FLAMINGO (*Phoenicopterus antiquorum*).
From a Photograph provided by the American Museum of Natural History.

whence it wound along the coast to Ariminum (Rimini), where it ended, or rather where the name ceased; for the Via Æmilia (see EMILIAN PROVINCES) was a continuation of it. The whole length of the road from Rome to Ariminum was (according to the Jerusalem Itinerary), 222 m., and according to the Antonine, 210 m. Remains of it at various points assist the antiquary in tracing its direction.

FLAMINIUS, *fla-mĭn′ĭ-ŭs*, CAIUS: d. B.C. 217: Roman general of plebeian birth. He was chosen tribune B.C. 232, procured the passage of an agrarian law which was violently opposed by the Optimates, became pretor 227; and soon afterward consul, and, though he achieved a great triumph over the Insubrian Gauls 223, was removed from his office by the senate. In 220 he became a censor and constructed the celebrated circus and highway from Rome to Ariminum on the Adriatic, to which his name was given. This great road, by some accounts 222 m. long, and by others 210 m., was built both for military and for commercial purposes, and secured direct communication with the recently conquered territory of Gaul. In B.C. 217 he was again chosen consul, and, without waiting for the prescribed public and religious ceremonies that followed election, hastened to Arretium to engage in an aggressive campaign against Hannibal. The latter, however, had crossed the Apennines and was marching toward Rome before Flaminius was aware of his intentions. Flaminius then started in pursuit, penetrated the narrow defile formed by the Cortona hills near Lake Thrasymene, during a thick haze, and was there surprised by Hannibal, who had made a stand on the hills. The Roman army, completely surrounded, fought valiantly for 3 hours, and lost 15,000 killed, including Flaminius, June 23.

FLAMINIUS, *fla-mĭn′ĭ-ŭs*, TITUS QUINCTIUS, abt. B.C. 228-174: Roman general. He began his public career as a tribune under Marcellus, became questor B.C. 199, and consul 198 and immediately went to Macedonia to conduct the war against King Philip, who had obtained advantage over previous Roman commanders. In his first engagement he defeated the Macedonians with great loss, and made himself master of Epirus. By his military prowess and his just and liberal administration, he won the adhesion and support of the various Grecian states, and on the expiration of his year as consul was continued in command of the great army by special vote of the senate. All his attempts to negotiate peace having failed, he resumed the campaign against Philip early in B.C. 197, and after a skirmish between the cavalry near Pheræ, both armies met at Cynoscephalæ, in Thessaly. At first the right of the Macedonian army led by Philip in person pressed so hard against the Roman left that it gave way and began a confused retreat. Flaminius ignoring this disaster, charged the Macedonian left while it was forming on the hills, and before the officers could form the lines, the Romans fell upon the enemy, and a frightful slaughter ensued. While Flam-

inius was operating against the Macedonian left, another part of his army attacked the Macedonian right as it was pursuing the Roman left, and turned the defeat on the hills into a general rout. A panic seized the whole Macedonian army, the superiority of the Roman legion over the Macedonian phalanx was demonstrated; and the losses of the day amounted to 8,000 killed and 5,000 prisoners on the Macedonian side, and only 700 in all on the Roman. Philip surrendered all his Greek towns in Europe and Asia, paid a heavy indemnity to the Romans, and was allowed to retain his Macedonian kingdom almost intact. In the following year, at a great assembly of Greeks at the Isthmian games, Flaminius proclaimed liberty and independence to all the Greek states which had been subdued by Macedon. In 195 he overthrew the tyrant Nabis in Sparta, spent some time in restoring peace and prosperity to Greece, and in 194 returned to Rome and was honored with a three days' triumph. During 192-190 he was diplomatic representative of Rome in Greece, in 189 became censor, 183 undertook an embassy to Prusias, King of Bithynia, to induce him to surrender Hannibal, who was an exile there, and was frustrated in his designs by the suicide of the famous Carthagenian general. Flaminius's latter days were peaceful and happy.

FLAMMARION, *flâ-mâ-rė-ōng'*, CAMILLE: French astronomer: b. Montigny-le-Roi, Haute-Marne, 1842, Feb. 25. He was intended by his family for the priesthood, and studied first in the seminary at Langres and then in Paris. In 1858 he changed his purpose and entering the imperial observatory, studied astronomy there till 1862, when he succeeded Abbé Moigno as editor of *Cosmos*. In 1865, he became scientific editor of the *Siècle*, and began delivering popular lectures on astronomical subjects, and in 1868 made a number of balloon ascensions to study the atmosphere at great altitudes. In 1882 he founded the monthly magazine *L'Astronomie*, and in 1887 started the French Astronomical Society. M. Flammarion has gained considerable fame for original researches in astronomy, especially in connection with double and multiple stars, colors of stars, sun-spots, and the proper motion of the stars; but is much better known for his excellent, well-written and accurate popular hand-books. He is an active member of numerous scientific societies, has become noted by his lectures on Spiritualism; and has published *La Pluralité des Mondes Habités* (1862); *Les Mondes Imaginaires et les Mondes Réels* (1864); *Les Merveilles Célestes* (1865); *Dieu dans la Nature* (1866); *Histoire du Ciel* (1867); *Contemplations Scientifiques* (1868); *Voyages Aériens* (1868); *L'Atmosphère* (1871); *Vie de Copernic* (1873); *Les Terres du Ciel* (1877); *François Arago* (1879); *Astronomie Populaire* (1880); *Les Etoiles et les Curiosités du Ciel* (1881); *Le Monde avant la Création de l'Homme* (1886); *Les Tremblements de Terre* (1886); *Uranie* (1889); *Qu'est-ce que le Ciel* (1891); *La Planète Mars et ses Conditions d'Habitabilité* (1893). Several books have been translated into English.

FLAMSTEED, *flăm'stēd*, JOHN: 1646, Aug. 19—1719; b. near Derby, England: first astronomer-royal of England, for whose use the Royal Observatory at Greenwich (called Flamsteed House) was built. He early applied himself to mathematical and astronomical pursuits. While yet a youth he mastered the theory of the calculation of eclipses; and his calculations of some remarkable eclipses of the moon called to him the attention of Sir Jonas Moore, then surveyor-gen. of the ordnance, through whom, and in connection with whose dept., he was appointed astronomer to the king 1675. The year following, the observatory at Greenwich was built, and Flamsteed began that series of observations that constitute the commencement of modern practical astronomy. He formed the first trustworthy catalogue of the fixed stars, and furnished those lunar observations on which Newton depended for the verification of his lunar theory. Extracts from the papers of Flamsteed found in the observatory by Francis Baily, and published by authority of the admiralty 1835, brought to light a sharp quarrel between Flamsteed and Newton and Halley with regard to the publication of the results of Flamsteed's labors. The *Historia Cœlestis Brittanica*, his great work, in three vols., giving an account of the methods and results of astronomical observations up to his time, of which the printing began before his death, was not published till 1725. While following his scientific pursuits, Flamsteed qualified himself for holy orders, and at the age of 38 years, was presented to the living of Burslow, in Surrey, which he held till his death. He was so ill supported that he had to teach for his own support, and erect instruments at his own expense. With the proceeds of his living and some money bequeathed him by his father, who died in 1684, he was enabled to provide some needful apparatus, which, on his death, was claimed by the government as public property.

FLAN, v. *flăn* [etym. doubtful]: in *arch.*, to splay or bevel internally, as a window pane. FLANNING, n. internal flare of a window jamb, or of a fireplace; an embrasure; coving.

FLANCHES, *flănch'ez*, or FLANQUES, *flănks*, in Heraldry: an ordinary composed of arched lines drawn from the upper angles of the escutcheon to the base points; the arches of the flanches almost meet in the center of the shield.

FLANCONNADE, *flăng-kŏn-ād'*, a thrust in fencing (q.v.).

FLAN'DERS, HENRY, American lawyer: b. Sullivan county, N. H., 1826, Feb. 13. He studied law and since 1850 has practised his profession in Philadelphia. He has published: *Maritime Law* (1852); *The Law of Shipping* (1853); *Lives of the United States Chief Justices* (1855-8); *An Exposition of the Constitution of the United States* (1869); *Law of Fire Insurance; Adventures of a Virginian; Memoirs of Cumberland;* etc.

FLANDERS.

FLANDERS, *flăn'dėrz:* formerly the name of an extensive and almost independent territory ruled by 'counts', and embracing, besides the present Belgian provinces of of the same name, the s. portion of the province of Zealand in Holland, and some of the departments in the n.e. of France. Cæsar found this district inhabited by the Morini, the Menapii, and the Nervii, and, having conquered these tribes, he annexed the country. Under the rule of the Franks, the river Scheldt, which flowed through the district, formed the boundary line between Neustria and Austrastia, in consequence of which the n. and s.w. part of the territory comprised under the term Flanders, though its population was decidedly Germanic, came to belong to France, while the s.e., though to a large extent non-Germanic, was after 1007 included in the German Empire. Flanders obtained its name from the *Vländergau* (*pagus Flandrensis*, the district around Bruges and Sluis), whose counts had been made wardens of the n.e. coasts of France at the period of the incursions of the Normans, in the latter half of the 9th c., and who extended the name of their hereditary possessions to the whole district which they governed. The first count or markgraf of the country is said to have been Baldwin, surnamed *Bras de Fer* (Iron Arm), who married Judith, daughter of King Charles the Bald of France, and widow of Ethelwulf king of England, and afterward received the newly created 'mark' or county (864) as a hereditary fief from his father-in-law. He extended his territories by the addition of Artoivs; which was held by his successors until Philippe Auguste reunited it to France. He died 879, but not until he had inaugurated the industrial greatness of Flanders by introducing into it a great number of workmen skilled in the manufacture of woolen and other goods. Baldwin IV., or the Bearded, one of the successors of Baldwin *Bras de Fer*, received in fief from Emperor Henry II., the burgraviate of Ghent, Walcheren, and the islands of Zealand, and thus became a prince of the German Empire. He was succeeded by his son Baldwin V., or the Pious (1036-67), who increased his possessions by the addition of the German territory between the Scheldt and the Dender, belonging to the Duchy of Lower Lorraine. To this he added Tournay, the supremacy over the bishopric of Cambray (to which, till the erection of the new bishopric of Arras, the county of Flanders had been ecclesiastically subordinate), and the county of Hainault. During the middle ages, Flanders figured prominently in the political affairs of Europe—the counts of Flanders being more powerful and wealthy than many European kings. Baldwin IX., founder of the Latin kingdom at Constantinople, died 1206, leaving two daughters, one of whom died without children; the other bequeathed Hainault to John of Avennes, her son by her first marriage; and Flanders to Guy Dampierre, her son by a second marriage. Meanwhile the industrial prosperity of the cities of Flanders had become so great that the citizens

began to feel their own power, and to claim independence. They formed republican communities like the free cities of Germany, with this difference, that they admitted the nominal suzerainty of the counts. But they were not afraid to take up arms in defense of their liberties against their nominal masters. Witness the insurrection headed by Jakob van Artevelde (q.v.) against the cruel government of Count Louis I. On the marriage of Marguerite, daughter and heiress of Louis II., Count of Flanders, to Philip the Bold of Burgundy, the country was united to the Burgundian territories in 1384, and afterward shared the fortunes of that duchy. The dukes of Burgundy brought great part of the former duchy of Lower Lorraine under their dominion, and thus laid the foundation for the subsequent union of the states of the Netherlands, in which Flanders continued to form one main component part. On the death of Charles the Bold, these territories passed, 1477, to the House of Hapsburg, by the marriage of his daughter Mary to the archduke Maximilian. After Burgundy had passed with King Philip II. to the Spanish line of the House of Hapsburg, the territory of Flanders was considerably diminished, as not only was the portion called Dutch Flanders transferred to the Estates-general by the peace of Westphalia, but, in the time of Louis XIV., France seized upon another portion of Flanders, as also part of Hainault, Cambray, and Artois, and was confirmed in her possession by the peace of Aix-la-Chapelle, of Nimeguen, and of Utrecht. By the last, and by the treaty of peace concluded at Rastadt, the remains of the Spanish Netherlands again fell into the hands of the House of Austria. In 1794, Flanders, like the other provinces of Belgium, was incorporated with the French Republic, and afterward with the Empire, and formed the depts. of Lys and Escaut; the Congress of Vienna, however, conferred these positions on the new kingdom of the Netherlands, with which they remained united till the formation of the kingdom of Belgium (q.v.). The Belgian portion of Flanders is now divided into the provinces of E. and W. Flanders (q.v.).—Compare Praet, *Histoire des Comtes de Flandres, et de l'Origine des Communes Flamandes* (Brussels 1828); Le Glay, *Histoire des Comtes de Flandres jusqu' à l'Avènement des Ducs de Bourgogne* (2 vols. Paris 1843); Kervyn van Lettenhoven, *Histoire de Flandres* (3d ed. 5 vols. Bruges 1874-5), etc.

FLAN'DERS, East: province in the n.w. of Belgium, bounded on the e. by the provinces of Antwerp and Brabant, on the s. by Hainault, on the w. by West Flanders, and on the n. by the Dutch province of Zealand: 1,160 sq. m. East Flanders, having abt. 768 inhabitants to a sq. m., is the most populous province of the most populous country in Europe: see Belgium. It is watered mainly by the Scheldt, and by its affluents the Lys and the Dender. The surface is low and level. The soil has been rendered extremely fertile by spade cultivation and an excellent ma-

nuring system. Besides the ordinary varieties of grain, potatoes, flax, hemp, and hops are produced in great quantity. The district in the n.e. of the province, between the towns of Antwerp and Ghent, is celebrated as a flax-growing quarter. The manufactures are chiefly lace, damasks, linens, woolens, bobbinet, silk, and cordage; sugar-refining, brewing, and distilling are also carried on. Chief towns: Ghent, Alost, and Dendermonde. Pop. of province (1900) 1,029,971.

FLAN'DERS, West: most w. province of Belgium; bounded on the n. by the North Sea, and on the w. and s. by France; 1,250 sq. m. Its chief rivers are the Lys and the Iser; but it is watered by numerous smaller streams and is intersected by many important canals. Its surface is flat, with sandy hills in the s. and along the coast; and its soils sandy, but well cultivated and productive. It has fewer products and manufactures than East Flanders. Chief towns: Bruges, Courtrai, and Ostend. Pop. of province (1900) 805,236.

FLANDRIANS, n. *flăn'drī-anz* [named from the country of Flanders, in which the sect flourished]: subdivision of the Mennonite Anabaptist sect: see Anabaptists.

FLANEUR, n. *fla-nėr'* [F.—from *flâner*, to lounge or saunter about]: a lounger.

FLANG, n. *flăng:* a miner's two-pointed pick.

FLANGE, n. *flănj* [Ger. *flantsche*, a slice: F. *flanchère*, a flanker, a side piece]: a raised or projecting rim of anything, as of a railway-wheel, or a pipe: it serves as a bearing or as a means of fixing and holding in place. Flanged, a. *flănjd*, having a flange, or connected by a flange.

FLANK, n. *flăngk* [F. *flanc:* Ger. *flanke:* It. *fianco*, the flank of a body]: the fleshy or muscular part of an animal between the ribs and the hip; the side of anything, as of an army—the flanks of an army being its wings or bodies of men on its extreme right or left, prepared to close in on an enemy attacking the centre; the extreme right or left of a military position; the part of a fortification placed to defend another (see Fortification): V. to attack the side or flank of an army; to pass round the side or flank; to border; to touch; to be posted on the side. In evolutions, 'to flank' is to take such a position with troops as either to aid one's own army in an attack on the enemy, by leading the latter to suppose that his flanks are in danger in his present position, or to prevent him from advancing on one's comrades by threatening his flanks if he should do so. Flank'ing, imp. attacking on the side; commanding on the flank. Flanking-party, body of horse or foot, hanging upon and harassing the flank of an enemy's force. Flanked, pp. *flăngkt*, covered or commanded on the flank. Flank'er, n. he or that which flanks. Flank files, the soldiers marching on the extreme right and left of a company or any other body of troops. Flank company, the company on the

right or left when a battalion is in line. FLANK MOVEMENT the posting of troops so as to be able to attack the extreme right or left of an enemy. FLANKS OF A FRONTIER, certain salient points in a national boundary, strong by nature and art, and ordinarily projecting somewhat beyond the general line: their effect is to protect the whole frontier against an enemy, as he dare not penetrate between them, with the risk of their garrisons, reënforced from their own territories, attacking his rear, and cutting off communication between him and his base. TURN THE FLANK, to attack a body of troops on the side. To OUTFLANK, to extend beyond the extreme right or left of an enemy; succeeding by maneuvers in commanding the flank of an enemy who has been, on his part, endeavoring to flank one's own force. INNER FLANK, the part nearest the point on which a line rests, or the part farthest from the enemy.

FLANKS, n. *flăngks* [etym. doubtful]: a wrench or any other injury in the back of a horse.

FLANNEL, n. *flăn′nĕl* [F. *flannelle*, flannel: W. *gwlanen*, flannel—from *gwlan*, wool: Sp. *flanéla*—formerly written FLANNEN]: soft woolen cloth, loose in texture. FLAN′NELED, a. *-nĕld*, covered or wrapped in flannel—*Flannel* differs from broadcloth and most other woolen fabrics in being woven of yarn more loosely twisted, and having less dressing. Welsh flannel from the wool of the Welsh mountain-sheep, has highest reputation. A more closely spun and woven flannel, used for cricketing and rowing shirts, etc., and dyed and printed with various colors and patterns, is made in the west of England cloth-making district, in the vicinity of Stroud, in Gloucestershire. Fine light flannel of this kind is made in France and Belgium; some of this is twilled, and approaches nearly in quality to French merinoes, but is much softer. Coarse flannel, called *Galways*, is made in Ireland, and is chiefly used by the peasantry of the country.—In the United States, the flannel manufacture is prosperous, and some of the product is of the highest grade.

FLAP, n. *flăp* [representing the sound of a blow with a flat surface: Dut. *flabbe*, a slap, a fly-flap: Low Ger. *flabbe*, a hanging lip]: anything broad, hanging loose, and easily moved; the motion and noise of it, as sails against the mast; one of the pieces loosely covering the outside pockets of a coat: V. to move, as wings; to move or fall, as something loose; to beat with a flap. FLAP′PING, imp.: ADJ. moving something broad and loose; beating. FLAPPED, pp. *flăpt:* ADJ. struck with something broad; let down. FLAP′PER, n. he or that which flaps. FLAP-EARED, having broad loose ears. FLAP-JACK, a sort of broad pancake. FLAP-MOUTHED, having loose hanging lips. FLAP-DRAGON, a small edible taken out of a dish containing spirits in flame, and immediately swallowed; a fanciful or unnatural viand of a similar kind; snap-dragon: V. to gulp down or swallow a fanciful or unnatural viand.

FLARE, v. *flär* [Dan. *flagre;* Ger. *flackern*, to flicker, to

flutter: Norw. *flara*, to blaze, to flame: L. *flagrārĕ*, to blaze, to flame (see FLAGRANT)]: to burn or glitter with a splendid but transient show; to show an unsteady light; to spread outward: N. a broad unsteady light, offensive to the eye. FLA′RING, imp.: ADJ. burning with a wavering light; showy. FLARED, pp. *flärd*. FLA′RINGLY, ad. *-lĭ*. To FLARE UP, to rouse up suddenly to anger; to make an unexpected show of temper.

FLASH, n. *flăsh* [representation of the sound made by a dash of water or by a sudden burst of flame: Swiss, *flatschen*, to splash; *flatzgen*, to blaze: Icel. *flasa*, to burn violently: comp. Gael. *flaiche*, a sudden burst, as wind or sunshine]: a sudden but transitory burst of light or flame; a sudden burst, as of wit; a short transient state: V. to burst or open instantly on the sight; to strike or throw, as a burst of light; in *OE.*, to dash or splash in water: ADJ. in *slang*, denoting that which is spurious, deceptive, or roguish. FLASH′ING, imp.: ADJ. bursting forth, as a flood of flame: N. act of blazing; a sudden and momentary burst, as of light; in *glass-making*, the expansion of an open glass vessel produced by revolving it at nearly a melting heat. FLASHED, pp. *flăsht*. FLASH′Y, a. *-ĭ*, showy, but empty; gay. FLASH′ILY, ad. *-lĭ*. FLASH′INESS, n. the state of being showy but unsubstantial. FLASH′INGS, n. plu. pieces of lead or zinc, or other metal used to cover joinings on roofs, also called *aprons* in Scotland. FLASH-LANGUAGE, the language spoken by thieves. A FLASH IN THE PAN, a sudden failure of any enterprise.—SYN. of 'flash, v.': to glitter; glisten; glister; flare; glare; flicker.

FLASK, n. *flăsk* [Ger. *flasche;* Sw. *flaska;* OF. *flasque*, a flask, a bottle (see FLAGON)]: a kind of bottle for containing liquors or powder. FLASKET, n. *flăsk′ĕt*, a long shallow basket.

FLAT, a. *flăt* [imitative of the dashing down of something soft: F. *flac*, a clap by something soft: Dut. *vlecke*, a blot, as of ink: Dut. *vlack;* Ger. *flach*, flat, close to the ground: Icel. *flatr*, flat]: smooth; even; level; tasteless; insipid: depressed; prostrate; unanimated; positive or downright; in *music*, out of tune, by not vibrating quite quick enough: N. a level or extended plain; a shoal or shallow; an even surface; the broad side of a blade; a story or floor of a house; a sign in music (♭) which lowers the following note half a tone; at the beginning of a piece of music, it denotes that all the notes on its line or space, with their octaves above and below, are to be played flat; in *slang*, any one easily deceived or taken in. FLAT′TISH, a. somewhat flat. FLAT′LY, ad. *-lĭ*, evenly; positively. FLAT′NESS, n. state or quality of being flat; deadness; dulness; insipidity; dejection of fortune or mind. FLAT′TED, a. rendered even on the surface; made flat; wanting in life or spirit. FLAT′TEN, v. *flăt′n*, to make flat; to become flat. FLATTENING, imp. *flăt′nĭng*. FLATTENED, pp. *flăt′nd*. FLAT′WISE, ad. with the flat downward; not on the edge. FLATLONG, ad. *flăt′lŏng*, in *OE.*, with the flat part downward.

FLATBUSH, *flăt'bûsh:* village of Kings co., N. Y., adjoining the city of Brooklyn and connected with its ferry system by numerous street railroads. It contains the co. almshouse, hospital, lunatic asylum, and nursery, has 5 churches and Erasmus Hall Acad.; was the scene of the battle of Long Island 1776, Aug. 27; and is a favorite place of residence of New York and Brooklyn business men. (See LONG ISLAND, BATTLE OF.) It became a part of Greater New York, 1898, Jan. 1.

FLAT'-FISH: popular name of the fishes of the family *Pleuronectidæ* (q.v.), as the flounder, plaice, sole, turbot, halibut, etc.; which have the body much compressed, and the sides unsymmetrical, swimming on one side. It is sometimes extended in its signification to include skates and other fishes of the Ray (q.v.) family, which are very different, being cartilaginous fishes, quite symmetrical, and swimming on the belly, though, like the *Pleuronectidæ*, generally keeping close to the bottom. It is never applied to the much compressed symmetrical fishes, such as the dory, which swim in the ordinary posture of fishes, the dorsal edge upward, the ventral downward.

FLATHEAD PASS: opening in the Gallatin range of the Rocky Mountains, 15 m. from Union Pass, in Montana. It is 6,769 ft. above sea level, and has long been a thoroughfare for the Flathead, Shoshone, and Bannock Indians.

FLATHEADS, *flăt'hĕdz:* name given to various tribes of American Indians because of their practice of flattening the heads of their infants by mechanical compression. The chief tribes which both flatten the top of the head and indent the forehead are the Chinooks, Calapuyas, Clickitats, Clatsops, Cowalitsk, and Clatstani. The practice at one time prevailed also among the Chickasaws, Choctaws, Natchez, Caribs, Toltecs, ancient Peruvians, and others; but has now become nearly obsolete, the fish-eating Chinook group on the Pacific coast being almost the only Indians that so disfigure the heads of their infants. The name has long been incorrectly applied to the Selish tribe, also named Hopilpo by Lewis and Clarke, who visited their reservation on the Bitter Root or St. Mary's river in Or., 1806–7. These do not flatten the head at all and never have done so. The remnant of the Selish tribe was removed from the Or. reservation to one in the Jocko Valley, Mont. 1871.

FLATHER, JOHN JOSEPH: an American engineer; b. 1862, June 9; was graduated at the Sheffield Scientific School, Yale University, 1885; professor of mechanical engineering at Purdue University, 1891–98. In the latter year he became professor of the same subject. Univ. of Minnesota. He wrote *Treatise on Steam Boilers; Dynamometers and the Measurement of Power*, etc.

FLATIDÆ, n. *flā'tĭ-dē* [L. *flata*—from *flo*, I blow]: in *entom.*, family of homopterous insects, akin to *Cicadidæ*, but having their wings covered with a white farinaceous

powder and so much resembling those of some moths that they have been called Moth Cicadas. They furnish a secretion called Chinese wax, which when removed is renewed. Flata is the typical genus of the family.

FLATTER, v. *flăt'tėr* [F. *flatter;* OF. *flater,* to pat, to caress: Icel. *fladra,* to wag the tail as a dog, to flatter: Ger. *flattern,* to flutter: Dut. *fletteren,* to flatter]: to praise falsely; to gratify another's self-love by praise; to soothe with praise; to raise false hopes in. FLAT'TERING, imp. ADJ. pleasing to pride or vanity; gratifying to self-love; encouraging hope. FLAT'TERED, pp. *-tėrd,* soothed by praise; pleased by commendation. FLAT'TERER, n. one who flatters. FLAT'TERINGLY, ad. *-lĭ.* FLAT'TERY, n. *-tėr-ĭ,* false praise; that which gratifies self-love; obsequiousness.—SYN. of 'flattery': adulation; compliment; praise.

FLATTERY, CAPE, *flăt'ėr-ĭ:* headland of Washington Territory, on the Pacific coast of the United States: see CAPE FLATTERY.—Another headland of the same name is on the e. coast of Australia, lat. 14° 52′ s., and long. 145° 20′ e.; about 30 m. n. of Endeavor Bay.

FLATULENT, a. *flăt'ū-lĕnt* [mid. L. *flatŭlen'tus,* flatulent—from L. *flātŭs,* a breath, a breeze: F. *flatulent,* flatulent]: windy; affected with air in the stomach and bowels; vain; empty. FLAT'ULENTLY, ad. *-lĭ.* FLAT'ULENCE, n. *-lĕns,* or FLAT'ULENCY, n. *-lĕn-sĭ,* distention of the stomach or bowels by the gases formed from food (see INDIGESTION). FLATUS, n. *flā'tŭs* [L.]: wind collected in the intestines; disturbance caused by it; a puff of wind; a breath.

FLAUCHTER, n. *flawcht'ėr:* person employed in carding wool; man who cuts turf, by means of a flauchter-spade.

FLAUNT, v. *flawnt* [Bav. *flandern,* to wave to and fro: Ger. *fladdern,* to flutter: Gael. *flann,* red or gaudy]: to wave to and fro in the wind; to move about in fine clothes to let them be seen, to display ostentatiously and offensively, to carry a pert or saucy appearance: N. anything displayed for show. FLAUNT'ING, imp. ADJ. making an ostentatious display. FLAUNT'ED, pp. FLAUNT'INGLY, ad. *-lĭ.*

FLAUTIST, n. *flaw'tĭst* [It. *flauto,* a flute]: a player on the flute.

FLAVEDO, n. *flā-vē'dō* [L. *flavesco,* I become yellow]: disease in plants which alters their green into a yellow color.

FLAVEL, *flăv'ėl,* JOHN: abt. 1627–1691, June 26; b. Bromsgrove, Worcestershire: English non-conformist. He was educated at Oxford, appointed curate at Deptford, settled as rector at Dartmouth 1656, and expelled from his benefice for refusing to subscribe to the Act of Conformity 1662. Subsequently he preached privately as occasion offered till 1687, when a royal license to worship without molestation was granted and his followers built

him a new church. His published works include *Husbandry Spiritualized* (1669); *A Saint Indeed* (1673); *Divine Conduct* (1678); *The Touchstone of Sincerity* (1679); *Personal Reformation* (1691); *Remains* (1691); *Exposition of the Assembly's Catechism* (1692); *The Soul of Man* (1698); and *Methods of Grace* (1698).

FLAVERIA, n. *fla-vēr'ĭ-a* [L. *flavus*, yellow, one of the species being used to dye that color]: in *bot.*, the typical genus of the composite sub-tribe *Flavericæ*, a sub-tribe of *Senecionideæ*.

FLAVIAN, *flā'vĭ-an*, F. *flâ-vē-ăng'*, I., Saint: abt. 309–404: patriarch of Antioch. He inherited great wealth, was a lay monk in early life, zealously applied his means and abilities to the church, and is credited with having devised the choir and introduced the responsive singing of the Psalter. In 381 he was chosen successor of Meletius as bp. of Antioch; in 387 prevented by his influence Theodosius the Great from punishing the seditious people of the city who had overthrown the statues of the emperor and empress, and throughout his administration opposed Arianism and the Mersulians. There were two others of the same name, of whom one became patriarch of Antioch and one patriarch of Constantinople, and both after death were enrolled among the saints.

FLAVINE, or Flavin, *flā'vĭn:* yellow coloring matter employed in dyeing, and imported in the condition of extract. It is understood to be the coloring matter of quercitron bark, and is used in place of it. When treated with hot water, flavine yields a turbid solution, which, settling, deposits a yellow-brown powder. In dyeing with it, the cloth is first treated with an aluminous mordant (see Calico); and on subsequent immersion in the solution of flavine, a fine yellow color is fixed on the cloth. The coloring power of the extract flavine as imported is so great that one ounce is equal in dyeing qualities to one lb. of quercitron bark.

FLAVOR, n. *flā'vėr* [F. *flairer*, to smell, to scent; *fleurer*, to exhale an odor: OE. *flaware*, a strong smell]: peculiar odor; fragrance; taste; V. to impart a smell or taste to. taste or smell; quality of anything which affects the smell; Fla'vorless, a. destitute of flavor. Fla'voring, imp. Fla'vored, pp. *-vėrd:* Adj. having a quality that affects the sense of smelling or tasting. *Note.*—Skeat says the primary meaning of Flavor is 'hue,' and that the etymon is mid. L. *flavor*, golden coin; then, 'a yellow or bright hue'—from L. *flavus*, yellow; but that the sense was modified by OF. *flairer*, to exhale an odor.

FLAW, n. *flaw* [Sw. *flaga*, a crack, a flaw: W. *fflaw*, a splinter; connected with Flag and Flake]: a blemish; a crack; a defect; in *OE.*, a sudden gust; a violent blast of wind; V. to crack; in *OE.*, to render nugatory, or of no effect. Flaw'ing, imp. Flawed, pp. *flawd.* Flaw'y, a. *-ĭ*, having a blemish or defect. Flaw'less, a. without a blemish. Flaw-piece, slab from the outside of the log.

—Syn. of 'flaw, n': defect; fault; imperfection; speck; spot; breach; gap; fissure.

FLAX, n. *flăks* [AS. *fleax*, flax; *feax*, the hair: Dut. *vlas;* Ger. *flachs*, flax: Bohem. *wlakno*, unspun flax, fibres]: a plant with small blue flowers—the *Līnŭm ūsĭtātĭs'sĭmum*, ord. *Linācĕæ*; the prepared fibres or threads of the same which are made into linen cloth. Flax-dresser, one who prepares the fibres. Flax'en, a. *-ĕn*, made of or resembling flax; fair, or of the color of tow. Flax'y, a. *-ĭ*, composed of or resembling flax. Flax-weed, in *bot.*, *Linaria vulgaris*. Flax-worts, name given by Lindley to the order *Linaceæ*.

FLAX (*Linum*): genus of plants comprising the greater part of the nat. ord. *Linaceæ;* an exogneous order allied to *Geraniaceæ* and *Oxalideæ*, consisting of annual and perennial herbaceous plants, with a few small shrubs. There are about 90 known species of this order scattered over the globe, but most abundant in Europe and n. Africa. Their leaves are simple, entire, without stipules, and generally alternate. The Common Flax or Lint (*L. usitatissimum*) is by far the most valuable. It is a hardy herbaceous annual with beautiful blue flowers about an inch in diameter. In a wild state it is about 18 inches high, but grows much taller when cultivated. In a good soil, with room for full development, it throws out numerous branches each bearing many seeds, but if crowded, it sends up a single stalk, which blossoms at the top and ripens but few seeds. The stem is smooth and the leaves narrow and lanceolate. The flowers appear in loose panicles. Each part is in five divisions. The calyx has five sepals, the corolla five petals, and five stamens surround the pistil, which has five styles. The lower portion of the pistil becomes the boll, or seed-head. This, in its early stages, is composed of five cells; but before ripening, each cell is divided by a portion so that the mature boll is composed of ten cells, each containing a seed. The seeds are dark brown, glossy, oval, oblong, flattened, with acute edges, and pointed at one end, and yield an oil (Linseed Oil) which has many industrial uses. The stalk consists of three portions; the woody stem, which contains a pith; an inner bark which consists of long, tough fibres which adhere together and to the other portions of the plant with which they come in contact; and the outer bark. The inner bark is the only portion of the stalk which is of much value. The fibres are very tough and strong, are excellent for weaving or spinning, are very white when bleached, and are easily dyed. They are used for a great variety of purposes, such as making cloth of fine delicate qualities as well as the coarser and heavier grades; linen thread, both strong and pliable, and fine qualities of writing paper (see Linen).

Soil, Cultivation, and Harvesting.—While flax can be grown on a great variety of soils it thrives best on a deep dry loam. Wet land must be thoroughly underdrained, and clay land finely pulverized, before good crops can be

produced. Light, thin soils give a small yield of seed and an inferior fibre. As the roots of the plant are about half as long as the stalk deep plowing is essential and thorough pulverization of the surface is imperative. In the preparation of the soil, especially in Europe, a systematic rotation of crops is practiced, flax occupying the same land not oftener than once in 5 or 10 years. The best and ripest seed of the previous year's crop should be obtained for sowing, and it should be cleaned in the best possible manner to free it from the seeds of weeds and to remove the lighter seeds of the grain itself.

FLAX, New Zealand: a valuable fibre quite different from common flax; obtained from the leaf of an endogenous, instead of the stem of an exogenous plant. The plant yielding it is *Phormium tenax*, often called New Zealand Flax, sometimes Flax Lily and Flax Bush; of the nat. ord. *Liliaceæ*, a perennial plant, native of New Zealand and Norfolk Island; its leaves resemble those of an Iris, are from two to six ft. long and one to two or three inches broad. The flowers are produced in a tall branched panicle; are numerous, brownish yellow, not beautiful; the fruit is a three-cornered capsule with numerous compressed jet-black seeds. The fibre of the leaves is very fine and very strong, and was used by the New Zealanders, before their country was discovered by Europeans, for making dresses, ropes, twine, mats, cloth, etc. New Zealand Flax is exported for making twine and ropes; and the plant is cultivated in its native country, and its culture has been attempted in parts of Europe; but the winters except in the south, are too cold for it. To obtain the fibre, the leaves are cut when at their full size, and usually macerated for a few days in water. But the New Zealanders procure the fibre in its greatest perfection, very long and slender, shining like silk, by a more laborious process, and without maceration, removing the epidermis from the leaf when newly cut, separating the fibres by the thumb-nails, and then more perfectly by a comb.

The roots are purgative, diuretic, sudorific, and expectorant; a good substitute for sarsaparilla.—The leaves, when cut near the root, exude a viscid juice, which becomes an edible gum.—The New Zealanders prepare a sweet beverage from the flowers.

FLAX DRESSING: there are three methods of soaking or retting the straw: Dew retting is the simplest and the least careful, the straw being spread over the field like hay, to be retted by the dew, and by the action of the elements. Pool retting is practiced by immersing the straw in pools of stagnant water, the softest water giving the best results. The pools are dug in the ground for the purpose, though a great deal of the Irish flax is retted in 'bog holes'. Retting in running water is the third method, this form of retting being practiced in Belgium; the famous Courtrai flax is retted in the sluggish and murky waters of the river Lys, the straw, in bundles,

being placed in large crates and weighted with paving stones until the crates sink sufficiently to fully cover the flax.

The first operation in cleaning or extracting the fibre is to pass the straw through a breaker which loosens the woody portions of the stem, and reduces them to fragments, to facilitate the next operation, the scutching, which whips out the 'chive' and all waste matters and leaves the pure flax fibre. In former times the scutching was done by hand, though now machinery is generally used. The scutched flax is subsequently hackled or dressed by repeated combings, which remove the short and broken or tangled fibre, these combings producing tow. Each hackling adds to the quality of the fibre, and of course to the cost. Flax is usually imported in the scutched form, the hackled flax known as 'dressed line'.

The use of flax has a greater antiquity than any other commercial fibre. It was cultivated and manufactured by the Swiss lake dwellers in the Stone Age in Europe, well preserved specimens of straw, fibre, yarn, and cloth being preserved in the museums. This ancient flax, however, was from another species, *Linum angustifolium.* The Egyptians produced and used flax thousands of years ago, and the Chaldeans and Babylonians carried its use to the highest state of textile development. Three thousand years ago the Phœnicians extended the culture, and the Greeks and Romans made it a household industry, and it became the aristocratic fibre. It is claimed that the ancient Mexicans knew of both flax and hemp, and its culture in this country goes back to the earliest date of our civilization.

A bast fibre, it may be considered, next to cotton, the most valuable and universally employed textile in the whole range of vegetable fibres. While the plant can be grown in nearly every portion of the temperate world, it is produced commercially in Great Britain and Ireland, Denmark, Sweden, Belgium, Holland, France, Germany, Russia, Austria, Spain and Portugal, portions of Africa and Asia, Japan and the Australian colonies. It thrives in Canada, the United States, and Mexico and in some of the South American countries. Good flax has been grown as far north as Alaska, and the flax of Archangel is famous.

It is mainly the European countries that cultivate flax for fibre, though some good flax is raised in Mexico and cheaper grades come from Canada. In the U. S., Argentine Republic, and British India it is cultivated for the seed. The chief use of the fibre is in the making of linen (q.v.) and linen thread; in the U. S. threads, twine, and crash are manufactured but no fine linen is woven. The principal product from the seeds is linseed oil (q.v.) which is used chiefly in the making of paint and varnish, and also in the manufacture of linoleum, oilcloth, printer's ink, waterproof fabrics not made of rubber, etc.

The residue after the extraction of the oil is the by-

product, the oilcake, a valuable cattle food, which, when ground, is known to commerce as linseed oil meal. This oilcake finds an extensive European market.

The cultivation of flax was brought to this country by the American colonists, the records showing that considerable quantities were grown in eastern Massachusetts as early as 1630. Its growth was early extended to other States, though for the most part it was a household rather than a commercial industry. In the fifties of the last century three-quarters of a million pounds of flax were produced in the U. S., Vermont, Connecticut, New York, and New Jersey leading in the culture. With the increased use of cotton fine flax culture steadily declined, and while, as late as1869, 13,000 tons of flax were produced a very small proportion was fine line, the bulk being mere tow for the bagging factories. A year or two later, when jute was admitted free of duty, the industry collapsed. But the raising of flax for the seed and the linseed oil industry has steadily advanced in the U. S. So long ago as 1791 the exports of flaxseed from the U. S. amounted to 292,460 bushels. In the same year began the manufacture of linseed oil in this country. In 1892 the United States took rank among the surplus flax-producing nations of the world and became an exporter of importance, a position since maintained. The flaxseed industry has migrated westward from its original home in Ohio and Kentucky, the chief flax producing States being North and South Dakota, and Minnesota. In 1902 the total flaxseed product in the U. S. amounted to 29,284,880 bushels.

Imported Riga seed gives the best results, although Belgian Riga (Belgian seed produced from one sowing of Riga seed) gives a fine fibre. When flax is grown for the production of seed alone, the ground is seeded at the rate of two to three pecks to the acre. For fibre culture one and a half to three bushels is the proper quantity per acre.

After the seed has vegetated and is about two inches high the weeding begins, for no fine flax can be produced if the crop is choked with weeds. Flax is harvested by pulling the straw out of the ground, roots and all, the straw being laid in handfuls to dry, and afterward made into bundles, which are stacked in the field. Practice varies, however, in different countries, as to the handling before the retting period. The cultivation of the plant for fibre requires harvesting before the seed is fully ripe, which impairs the quality and reduces the quantity of the crop of flaxseed. On this account, and because of the difference in seeding already mentioned, flax should be raised exclusively either for fibre or for seed.

FLAXMAN, *flăks'man*, JOHN: 1755, July 9—1826, Dec. 7; b. York: greatest of English sculptors. At the age of 15, he became a student in the Royal Acad., but never worked in the studio of any master. In 1782, he married Ann Denman, a woman of superior gifts and graces, who soon began to exercise a beneficial influence

upon his studies. Accompanied by her, he went 1787 to Italy, where he attracted attention which increased after his return to London 1794. He was elected an associate of the Royal Acad. 1797; royal academician 1800; and was appointed prof. of sculpture to that institution 1810. After the death of his wife 1820, he withdrew from society. Flaxman's most celebrated works are his *Outlines to Homer's Odyssey* (Rome 1793), and *The Iliad* (Lond. 1795), and his illustrations of Dante and Æschylus. Many of his works show wonderful grandeur of composition, and a pure and noble style. He was one of the first of those who, following the example of Winckelmann, strove to penetrate to the true spirit of antique art, in opposition to the false taste of the time. The study of vase-paintings, and of the Pompeian mural pictures, then just revived, led him to abandon the sickly mannerism of his predecessors for the severe simplicity of the antique, and he may be styled the author of modern *rilievo* (see ALTO-RILIEVO). His works are not all of equal value; and, in general, his skill in modelling was not equal to his inventive genius. The poetry of his conceptions is of high order. Flaxman contributed much toward bringing the outline style, now so popular, into general use. Of his sculptures, the best known in England are his bas-relief monument to the poet Collins at Chichester, the monument to Lord Mansfield, and that to the Baring family at Micheldean Church, in Hampshire. His model for the shield of Achilles, from the 18th book of the *Iliad*, is particularly admirable. See Prof. Sidney Colvin's *Drawings of Flaxman, with an Introductory Essay on his Life and Genius* (London 1876).

FLAY, v. *flā* [Icel. *flaga*, to cut thin turfs: Dut. *vlaegen*, to flay]: to strip off the skin of an animal. FLAY'ING, imp. FLAYED, pp. *flād*. FLAY'ER, n. one who.

* FLEA, n. *flē* [Ger. *floh;* Icel. *fló*, a flea]: small dark brown insect, surprisingly nimble, and very troublesome by its bite. See PARASITES. FLEA-BITE, red spot caused by the bite of a flea; slight wound or pain; a matter of little consequence. FLEA-BITTEN, bitten or stung by a flea; marked with spots as if flea-bitten. FLEA-WEED, in *bot.*, *Galium verum*. FLEA IN HIS EAR, sharp and disagreeable rebuff.

FLEA'BANE, *flē'bān* (*Pulicaria*): genus of plants of the nat. ord. *Compositæ*, sub. ord. *Corymbiferæ*, having hemispherical imbricated involucres and yellow flowers; the whole plant emitting a peculiar aromatic smell, sometimes compared to that of soap, which is said to be efficacious in driving away fleas. One species (*P. dysenterica*), common in moist places, with oblong leaves, stem 12–15 inches high, cottony, and bearing panicled flowers, has considerable reputation in diarrhœa and dysentery. The Russian soldiers, in the expedition to Persia under Gen. Keith, were much troubled with dysentery, which was cured by this plant.—*Conyza squarrosa*, also called fleabane, belongs to a nearly allied genus.

FLEAM, n. *flēm* [F. *flamme*, a lancet—from mid. L. *flebot'ŏmum*—from Gr. *phlebŏtŏmon*, a lancet—from *phleps*, a vein; *tŏmē*, a cutting: Dut. *vlieme*, a lancet, a sharp-pointed thing: Bret. *flemm*, the sting of a bee (see PHLEBOTOMY)]: an instrument for bleeding cattle; a gum-lancet. FLEAM-TOOTH, a tooth of a saw in the form of an isosceles triangle; a peg-tooth.

FLÈCHE, n. *flĕsh* [F. *flèche*, an arrow]: in *fort.*, a field-work consisting of merely two faces forming a salient angle pointing outward.

FLECHE, LA, *lâ flāsh:* town of France, dept. of Sarthe: agreeably situated on the right bank of the Loire, 24 m. s.s.w. of Le Mans. It is well-built and has three principal streets, which are wide and well paved. Its principal building is the military school with a library of 15,000 vols. for the education of the sons of poor officers, or of soldiers who have highly distinguished themselves. The building now occupied by the school was a royal palace built by Henry IV., subsequently given by him to the Jesuits, and used as a Jesuit college. Here Prince Eugene, Descartes, and Picard the astronomer, were educated. Fleche has some trade in corn, hay and wine, also manufactures of linen, hosiery, and gloves. Pop. about 8,000.

FLÉCHIER, *flā-she-ā'*, ESPRIT: 1632, June 10—1710, Feb. 16; b. Perues, France: pulpit orator. He was educated in the college of the Fathers of Christian Doctrine in Avignon, appointed prof. of rhetoric at Narbonne 1659, and removed to Paris and accepted a place as parish catechist 1661. The next year he wrote a Latin poem of great eloquence on Louis XIV.'s famous tournament, which attracted much attention to him, and soon afterward he was appointed preceptor in the family of a councilor of state. In 1673 he was elected a member of the French Acad.; and received from the king the Abbey of St. Séverin, the post of reader to the dauphin, the bishopric of Lavaur 1685, and that of Nîmes 1687. His diocese contained numerous Huguenots, and on the revocation of the Edict of Nantes, his administration was confronted by ecclesiastical obstacles of serious moment. Yet so tender and moderate were all his dealings, that at his death Rom. Catholics and Protestants alike united in demonstrations of sincere grief. Flechier, noted in early youth for the eloquence, beauty, and power of his language, sustained this distinction through life, and delivered a number of funeral orations which were esteemed masterpieces of rhetorical art.

FLECK, n. *flĕk* [Icel. *fleckr;* Dut. *vlecke;* Ger. *fleck*, a spot: a word imitative of something wet thrown down, or jerked as a dirty brush]: a spot; a blot; a stain.

FLECKNOE, *flĕk'nō*, RICHARD: date of birth unknown; d. 1678; said to have been an Irish Rom. Cath. priest. He came to London, mingled in the war of the wits, and wrote several plays, all now forgotten. Flecknoe came under the lash of Dryden, whose satire, entitled *Mac-*

Flecnoe, is partly the model of Pope's *Dunciad* (q.v.), and will be remembered as long as the great satirist is remembered. From those who speak with some knowledge, we have the assurance that Flecknoe has been hardly dealt with; that though he did not rise to the rank of Dryden as a poet, he was the author of several fugitive pieces, not without grace, fancy, and happy turns of expression. Among his dramatic pieces are *Ermina, or the Chaste Lady; Love's Dominion* (printed 1654, dedicated to Cromwell's favorite daughter, Mrs. Claypole): and *The Marriage of Oceanus and Britannia*. His *Miscellanea or Poems of all Sorts*, appeared 1653.

FLEDGE, v. *flĕj* [Icel. *fleygr*, able to fly: Ger. *flügge*, feathered—from *fliegen*, to fly]: to be furnished with feathers and wings, as a bird; to feather an arrow. FLEDG'ING, imp.: N. a covering of feathers. FLEDGED, pp. *flĕjd*, covered with feathers. FLEDGE'LING, n. a bird newly fledged.

FLEE, v. *flē* [Icel. *flyja;* Dan. *flye*, to flee: AS. *fleon;* Ger. *fliehen;* L. *fugĕrĕ*, to flee]: to run with rapidity—*to flee*, as a man or beast—*to fly*, as a bird; to run from danger or for shelter; to hasten away; to avoid. FLEE'ING, imp. FLED, pp. *flĕd*, did *flee*; run. *Note.*—When a very great amount of speed is to be indicated, we apply *fly* to either man or beast.

FLEECE, n. *flēs* [AS. *flys;* Dut. *vlies*, a tuft of wool: Ger. *fliess*, a tuft of wool or hair]: the whole wool shorn from a sheep at one time: V. to shear or clip wool from; to spread over, as with wool; to strip or plunder. FLEECING, imp. *flē'sĭng*, stripping of money or property. FLEECED, pp *flēst:* ADJ. furnished with a fleece; stripped by exactions; cheated of one's money. FLEE'CER, n. *-sẻr*, one who strips or plunders. FLEE'CY, a. *-sĭ*, covered with wool; woolly; soft. FLEECE'LESS, a. without a fleece. FLEECE-WOOL, wool shorn from the living sheep, as distinguished from skin-wool from the skins of dead animals.

FLEER, v. *flēr* [Scot. *fleyr*, to make wry faces: comp. Norw. *flira*, to titter, to giggle]: to make a wry face; to grin; to sneer and mock; to treat disrespectfully: N. in *OE.*, mockery as expressed by words or looks; a flout. FLEER'ING, imp. FLEERED, *flērd.*

FLEET, v. *flēt* [from the notion of flowing water: Sw. *flyta;* Dan. *flyde*, to flow: AS. *fleotan*, to flow]: to flow away; to move rapidly; to vanish; in *OE.*, to pass away lightly, as, to fleet away time. FLEET'ING, imp. FLEET'ED, pp. FLEET, a. [It. *flusso;* Icel. *fliotr*, transitory, swift: Icel. *fljóta*, to float, to swim]: swift of pace; nimble; active. FLEET'ING, a. transient; passing rapidly. FLEET'LY, ad. *-lĭ*, nimbly; swiftly. FLEET'NESS, n. speed; swiftness; rapidity.

FLEET, n. *flēt* [AS. *flota*, a ship: Low. Ger. *flote*, a raft: Icel. *flóti;* F. *flotte*, a fleet (see FLEET 1)]: somewhat indefinite term for a number of war-ships or other vessels in company, or having one object or the same destination;

portions of a F. are known as divisions or squadrons. In the *navy*, a fleet is usually commanded by an admiral or a vice-admiral.

FLEET, n. *flēt* [Low Ger. *flot*, a shallow: Icel. *fljot*, a stream]: in *OE.*, a shallow water; a tide creek; an inlet; a shallow stream; a bog: V. to take off the cream from milk; to gutter as a candle. FLEET'ING, imp. FLEET'ED, pp.

FLEET-BOOKS: see FLEET MARRIAGES.

FLEET MAR'RIAGES: secret, and often irregular marriages. The practice of contracting clandestine marriages was very prevalent in England before the passing of the first marriage act (see MARRIAGE). The chapels at the Savoy and at May Fair, in London, were long famous for the performance of these marriages; but no other place was equal in notoriety for this infamous traffic to the Fleet Prison. Before the passing of the 26 Geo. II. c. 33, there was no necessity in England for any religious ceremonial in the performance of marriage, which might be contracted by mere verbal consent. Hence it was not in virtue of any special privilege existing within the liberty of the Fleet that marriage at that place became so common; but rather from the fact, that the persons by whom they were performed, having nothing to lose either in money or in character, were able to set at defiance the penalties enacted from time to time with a view to restrain this public nuisance. These marriages were in greatest repute 1674 to 1754. The first notice of a Fleet marriage is in 1613, in a letter from Alderman Lowe to Lady Hickes, and the first entry in a register is in 1674. Till this time, it does not appear that the marriages contracted at the Fleet were clandestine; but in the latter year, an order having been issued by the ecclesiastical commissioners against the performance of clandestine marriages in the Savoy and May Fair, the Fleet at once became the favorite resort for those who sought a secret marriage. At first, the ceremony was performed in the chapel in the Fleet; but the applications became so frequent that a regular trade speedily sprung up. By 10 Anne, c. 19, s. 176, marriages in chapels without banns were prohibited under certain penalties, and from this time, rooms were fitted up in the taverns and the houses of the Fleet parsons, for the purpose of performing the ceremony. The persons who celebrated these marriages were clergymen of the Church of England, who had been consigned for debt to the prison of the Fleet. These men, having lost all sense of their holy calling, employed touters to bring to them such persons as required their office. The sums paid for a marriage varied according to the rank of the parties, from half-a-crown to a large fee where the liberality and the purse combined to afford a large reward. During the time that this iniquitous traffic was at its height, every species of enormity was practiced. Young ladies were compelled to marry against their will; young men were decoyed into a union with most infamous women; and

persons in shoals resorted to the parsons to be united in bonds which they had no intention should bind them, and which were speedily broken to be contracted with some new favorite. The sailors from the neighboring docks were steady patrons of this mode: it is stated by the keeper of one of the taverns, that often, when the fleet was in, two or three hundred marriages were contracted in a week. Persons of a more respectable character also at times resorted to the Fleet. Thus the Hon. Henry Fox was here married to Georgina Caroline, daughter of the second Duke of Richmond. Pennant thus describes the neighborhood of the Fleet in his time: 'In walking along the street in my youth, on the side next the prison, I have often been tempted by the question: "Sir, will you be pleased to walk in and be married." Along this most lawless space was hung up the frequent sign of a male and female hand conjoined, with "marriages performed within" written beneath. A dirty fellow invited you in. The parson was seen walking before his shop, a squalid, dirty figure, clad in a tattered plaid night-gown, with a fiery face, and ready to couple you for a dram of gin or a pipe of tobacco.'—*London*, p. 193. Registers of these marriages were kept by the various parties who officiated. A collection of these books, purchased by government 1821, and deposited in the consistory court of London, amounted to the amazing number of between two and three hundred large registers, and more than one thousand smaller books, called pocket-books. These registers were not received as evidence in a court of law, not because the marriage was invalid, but because the parties engaged in the ceremony were so worthless that they were deemed undeserving of credit. Various attempts were made to stop this practice by acts of parliament: penalties were imposed on clergymen celebrating any marriage without banns; but these provisions were without effect upon men who had nothing to lose. At length, the nuisance became intolerable, for, owing to the difficulty of proving these marriages, respectable parties, who in folly had entered into them, found it often impossible to establish their marriage, and great confusion was produced. The act of the 26th Geo. II. c. 33, was therefore passed, which struck at the root of the matter by declaring that all marriages, except in Scotland, solemnized otherwise than in a church or public chapel, where banns have been published, unless by special license, should be utterly void. This act met strenuous opposition in the house of commons, especially by Mr. Fox, who had himself been married in the Fleet, but ultimately it was passed into a law. The public, however, were unwilling to surrender their privilege, and in 1754, March 26, the day before the act came into operation, there were no less than 217 marriages entered in one register alone. See Burn's *History of Fleet Marriages*.

FLEET PRISON, or The Fleet: celebrated London jail, which stood on the east side of Farringdon Street,

on what was formerly Fleet Market. The keeper was called the Warden of the Fleet. It derived its name from the Fleet rivulet, named from its rapidity, which flowed into the Thames, and is now one of the common sewers. By the act 5 and 6 Victoria, the Fleet Prison and the Marshalsea were abolished, and their functions transferred to the Queen's Bench, under the new name of the Queen's Prison. The Fleet was the king's prison as far back as the 12th c., and a receptacle for debtors since about the same period. The followers of Wat Tyler burned it in the reign of Richard II. In the 16th and 17th c., it acquired high historical interest from its having been the prison of the religious martyrs of the reigns of Mary and Elizabeth, and of the political victims of the courts of the Star Chamber and High Commission in that of Charles I. On the abolition of the Star Chamber 1641, it became a place of confinement for debtors and persons committed for contempt from the courts of Chancery, Exchequer, and Common Pleas. During the 18th c., it was the scene of every kind of atrocity and brutality, from the extortion of the keepers and the custom of the warden underletting it. The Fleet was several times rebuilt; the last building was erected after the burning of the older one in the Gordon riots 1780, the predecessor of which had been destroyed in the great fire of London 1666. Latterly, it usually contained 250 prisoners, and kept ward of about 60 outdoor *detenus* for debt, privileged to live within the rules.

FLEET'WOOD, or FLEETWOOD-ON-WYRE, *flēt'wûd-ŏn-wīr:* small but thriving town, seaport, and military station of England, county of Lancashire, on a promontory at the mouth of the estuary of the Wyre, about 20 m. s.w. from Lancaster. It is a modern town, and owes its origin and importance to its facilities for railway and steam-vessel communication. It is handsomely laid out, has an excellent harbor, and is a favorite resort for sea-bathing. There was formerly a govt. school of musketry, which promised to be for the north of England what Hythe and Aldershot are for the south, but it is now discontinued. Pop. about 6,500.

FLEG, n. *flĕg* [Gael. *flaiche,* a sudden squall or gust]: in *Scot.,* a sudden blow; a box on the ears; a kick; a fright; a scare.

FLEMING, n. *flĕm-ĭng* [Ger. *Flamander*—from F. *Flamand,* nickname given to the Flandrians on account of their tallness]: in *chh. hist.,* the same as Flandrians (q.v.).

FLEMING, n. *flĕm'ĭng:* a native of Flanders, in Belgium. FLEMISH, a. *flĕm'ĭsh,* of or from Flanders. FLEMISH-BOND, particular mode of brick-laying in a wall so as to tie and break joint. FLEMISH-BRICK, kind of brick used for paving; 72 will pave a square yard. They are of yellowish color and harder than the ordinary brick. FLEMISH-EYE, in *naut.,* an eye made at the end of a rope without splicing. FLEMISH-HORSE, in *naut.,* a foot-rope for the man at the earing in reefing.

FLEM'ING, John Ambrose, English electrical engineer: b. Lancaster, England, 1849. He was educated at the Royal College of Chemistry and St. John's College, Cambridge, and has been associated for many years with the progress of electrical science. He has published: *Short Lectures to Electrical Artisans* (1885); *Treatise on the Alternate Current Transformer* (1889–92); *Electric Lamps and Electric Lighting* (1894); *Magnets and Electric Currents* (1897); *Waves and Ripples in Water, Air, and Ether* (1902); etc.

FLEMING, May Agnes Early, Mrs.: Canadian story-writer: b. New Brunswick 1840; d. 1880. She was a prolific author of romances, mostly sensational, among them being: *Guy Earlscourt's Wife; Lost for a Woman; Pride and Passion.'*

FLEMING, Paul. See Flemming, Paul.

FLEMING, Sir Sandford, Canadian engineer: b. Kirkcaldy, Fifeshire, Scotland, 1827, Jan. 7. He went to Canada in 1845 where he constructed the Inter-Colonial railway through Nova Scotia, New Brunswick and Quebec. He was engineer in chief of the Canadian Pacific railroad 1871–80, and has published: *The Inter-Colonial: a History* 1832–76; *England and Canada; Time and Its Notations;* etc. He was knighted in 1897.

FLEMING, William Hansell, American Shakespearian scholar: b. Philadelphia, Pa., 1844, Aug. 23. He was educated at Princeton University and has published: *How to Study Shakespeare* (1897–9), and edited the *Bankside Shakespeare.*

FLEM'ISH LANGUAGE AND LITERATURE: dialect and literature of Flanders. The Vlaemisch or Flemish is a form of Low German still spoken in the Belgian provinces of E. and W. Flanders, Limburg, Antwerp, N. Brabant, and in parts of Holland and the Walloon provinces of Belgium. So little change has taken place in this dialect, that the form of speech in which the Council of Liptines drew up (in 742) the creed, in which pagans were made to express their renunciations of idolatry on being converted to Christianity, requires only the alteration of a few letters to make it intelligible to a modern Fleming. Flemish has much affinity with the Frisian, and constitutes, together with modern Dutch (originally identical with it, and now differing from it in only a few orthographical and otherwise unessential particulars), the national tongue of the whole of the Low Countries. The most ancient record of Flemish, is a fragment of a translation in prose of the Psalms a thousand years old. In the 13th c., public deeds began to be drawn up in the vernacular, which are perfectly intelligible in the present day (as the Ordinance of Henry I. of Brabant, 1229, in the *Brussels Book of Privileges*). In the same century, J. van Maerlant, 'father of Flemish poets,' author of *The Historical Mirror, Wapen Martin, Rymbibel,* etc., and W. van Utenhove composed numerous poems, and translated from the French and

German, and very probably from the Latin. Willems and other critics believe that to the Flemish must be ascribed the honor of the original and entire poem of *Reinœrt Vos*, the first part of which they refer to the middle of the 12th c., while the second part is attributed to W. van Utenhove, and supposed to have been written about 1250. The 14th c. was remarkable for the numbers and excellence of the Flemish *Sprekkers*, *Zeggers*, and *Vinders*, or wandering poets, some of whose works have been published by Blommaert; and for the origin of the Chambers of Rhetoric, which exerted a marked influence on the progress of literature during succeeding ages, and became the arbiters of literary and dramatic fame through the Netherlands generally. In the 16th c., the French element gained ascendency, and the old Flemish lost much of its original terseness and purity. Numerous translations of the Scriptures appeared; among the most remarkable of which are the Psalms by Dathenus (1556), and by Marnix (1580), author of the *Roomsche Biekorf* (1569). The translation of the entire Bible was not effected till 1618, when the General Synod of Dort decided to employ learned men capable of giving a correct version from the Hebrew and Greek texts; and this great work was completed by two Flemings, Baudaert and Walons, and two Dutchmen, Bogermann and Hommius. Strenous efforts were made at this period to give greater freedom to the Flemish language, hence this original Flemish version of the Bible has become a standard in regard to the construction and orthography of the language. Hooft, Vondel, and Cats are the three men whose names stand foremost among Flemish writers of the 17th c. Hooft was a poet, but is known best by his *History of the Netherlands*, which is held in high esteem by his countrymen Vondel, one of the leading men of his day, made his tragedies the vehicles of hurling most cutting satire on every obnoxious measure of the government; and his works still maintain their ground. He had great versatility of powers; and in his latter years, his talents were directed to the exaltation of Rom. Catholicism, to which he had been converted. Cats was essentially the poet of the people; and for 200 years, his works, popularly known as the *Household Bible*, have been cherished alike among the poor and the wealthy. Although Cats was a skilful lawyer, an active statesman, and a profound scholar, he found time to compose a great number of works, as the *Zorgvliet; Trouwring* (the Wedding Ring); *Houwelyck* (Marriage); which show intimate acquaintance with the every-day life of his countrymen. His writings are solid and informing, but dull and prosaic, and seldom reach the point of being interesting. The 18th c. was barren of poetic genius in the Low Countries, but it produced several good philologists, as Stevens, Huydecoper, and Ten Kate, the latter of whom is the author of a work on the Flemish language, which has served as a fundamental authority for modern writers. The arbitrary measures of the French govt. under Napoleon against the official use of Flemish,

had the effect of crushing for a time the spirit of nationalism, while it completely annihilated native literature; and it was not till after the revolution of 1830, that the Flemish language regained its footing in the Belgian provinces. This revival of the national form of speech is due mainly to the unremitting efforts of such writers as Willems, Bilderdijk, Cornelissen, Blommaert, Conscience, Delecourt, Ledeganck, etc., whose work have imparted fresh vigor, and greater grammatical precision to the Flemish. In 1841, on the occasion of a linguistic congress at Ghent, the members of the govt. for the first time publicly recognized the existence of the Flemish element in the people, and addressed the meeting in the national dialect. The last 30 years have confirmed this movement; and while the best foreign works have been rendered into Flemish, the writings of Blommaert, Conscience (q.v.), and other native authors have been translated into many European tongues. Vandenhoven (i.e., Delecourt), *La Langue Flamande* (1844); Lebrocquy, *Analogies Linguistiques* (1845); Höfken, *Vlämisch Belgien* (Bremen 1847); the bibliographical works of Snellaert (1867) and De Poller (1867); also Düringsfeld's *Von der Schelde bis zur Maas* (Leipzig 1861).

FLEMISH SCHOOL IN PAINTING. See PAINTING.

FLEMMING, *flĕm'ĭng*, PAUL: 1609, Oct. 5—1640, Apr. 2; b. Hartenstein, in the Erzgebirge: German poet. He studied medicine at Leipsic, but retired to Holstein 1633. In 1635, he was attached to the splendid embassy to Persia. He returned 1639, married, and resolved to settle as a physician in Hamburg, but died there the next year. Flemming stands at the head of the German lyric poets of the 17th c. His *Geistliche und weltiche Poemata* (Jena 1642) contain many exquisite love songs, which, for more than a century, remained unequalled in finish and sweetness. Other poems are distinguished for enthusiasm of feeling, ardent patriotism, and manly vigor, while his sonnets are marked by strength and originality. Flemming's longer poems describe the adventures of his journey; occasionally with great spirit, though they are not free from the weaknesses of his time. His beautiful hymn, *In allen meinen Thaten*, composed before his journey to Persia, proves his genius as a writer of sacred songs. His life, with his select poems, was published by Schwab (Stuttgard 1820). Compare Knapp, *Evangelischer Liederschatz* (Stuttg. 1837), and Müller in the *Bibliothek Deutscher Dichter des* 17 *Jahrhundert* (3 vols. Leipsic 1822); and Varnhagen von Ense, vol. IV. of the *Biographische Denkmale*.

FLENSBORG, *flĕns'bûrch:* important town in the province of Schleswig-Holstein (now Prussian; see SLESVIG), in the extremity of the Flensborg Föhrde, an inlet of the Baltic, and 19 m. n. of the town of Slesvig. It is cap. of a bailiwick of the same name, which includes the n. part of the district supposed to have been the country of the Angles, or Angli. Flensborg is said to have been founded in the 12th c., and named from its founder the Knight

Flenes. In 1284, it received municipal rights from King Valdemar. Flensborg is pleasantly situated, and has a good harbor, breweries and distilleries, iron and brass foundries, oil mills and brickworks; manufactures paper and glass, and has a great yard for building iron ships. The fisheries are productive, and the trade in grain and timber, etc., is brisk. Pop. 30,956.

FLERS, *flär:* town of France, dept. of Orne, in the n. of France, 35 m. w.n.w. of Alençon. It has an old castle, burned down in the Chouan war, but since restored. F. has considerable manufactures of linen, fustian, and especially of ticking. Pop. (1901) 13,680.

FLESH, n. *flĕsh* [Dut. *vleesch;* Ger. *fleisch;* AS. *flæsc,* flesh: Icel. *flicki,* a large piece of meat]: that part of an animal underlying the skin or covering, as distinguished from the bones and fluids; muscle and fat; animal food; the body, as distinguished from the soul; human nature; carnal state; present life; the pulpy part of food; sensual appetite; kindred: family: ADJ. of or like flesh, as *flesh-colored,* etc.: V. in *OE.,* to put to use for the first time by cutting flesh, as a sword; to initiate dogs or hawks into hunting by giving them flesh; to harden. FLESH'ING, imp FLESHED, pp.:, ADJ. *flĕsht,* fat; having abundance of flesh; in *OE.,* initiated FLESHER, n. *flĕsh'ėr,* in *Scot.,* one who kills and dresses meat for the market; a butcher. FLESH'INGS, n. plu. coverings resembling the natural skin, worn by actors. FLESH-BRUSH, a soft brush to be used on the skin to promote circulation and excite the surface secretions. FLESH-WOUND, a wound affecting the flesh only. FLESH-TINTS, colors used in representing the naked body. FLESH'LESS, a. without flesh. FLESH'LY, ad. *-lĭ,* animal; not vegetable; carnal; not spiritual. FLESH'LINESS, n. FLESH'Y, a. *-ĭ,* full of flesh; plump. FLESH'INESS, n. corpulence; grossness. FLESH-POTS, vessels in which to cook flesh; good or high living. ARM OF FLESH, mere human strength.

FLESH: ordinary term for muscular tissue. After the removal of the blood-vessels, nerves, connective (or cellular) tissue, etc., the flesh is found to consist of various textural elements (see MUSCLE).

FLESH-FLY, or BLUE-BOTTLE-FLY (*Musca vomitoria*): insect of the same genus with the common HOUSE-FLY (q.v.), which it much exceeds in size, though it is not equal in size to the Blow-fly (q.v.). The forehead is rust-colored, the thorax grayish, the abdomen blue with three black bands. The expanse of wings is nearly one inch. It deposits its eggs on flesh, for which purpose it often enters houses, having a remarkably delicate sense of smelling The maggots are frequent on meat in summer, notwithstanding all care that can be taken.—A nearly allied species (*M. Cæsar*), distinguished by its golden green color, is found in houses from the beginning of spring to the end of autumn. Another (*M. lardaria*), with silky tawny face, a black stripe on the crown, thorax glittering with four black stripes, and abdomen blueish gray, tesselated with

black, is most frequent in the end of autumn, frequenting bushes of ivy and late flowers, and is also a pest of the larder.

FLET, n. *flĕt*, or FLEAT, *flēt* [Ger. *flechten*, to plait]: mat of plaited straw for protecting a horse's back from injury by the load.

FLETA, *flē'ta:* title of a valuable treatise on the law of England. It is not known by whom this treatise, one of the earliest authorities on English law, was written, and it derives its title from the circumstance that it was written in the Fleet prison. Lord Campbell remarks—*Lives of the Chancellors*, i. 166 and note: 'I shall rejoice if I do tardy justice to the memory of Robert Burnel, decidedly the first in this class, and if I attract notice to his successors, who walked in his footsteps.' To them, too, we are probably indebted for the treatises entitled *Fleta and Britton*, said to have been written at the request of the king, and which, though inferior in style and arrangement to Bracton, are wonderful performances for such an age. *Fleta* must have been written after the 13th year of the king (Edward I.), and not much later; for it frequently quotes the statute of Westminster the second, without referring to the later statutes of the reign.

FLETCHER, *flĕtch'er*, ANDREW, of Saltoun: Scottish patriot and politician: 1653-1716; son of Sir Robert Fletcher and Catherine Bruce, daughter of Sir Henry Bruce of Clackmannan. Notwithstanding the strong anti-English feelings which characterized him through life, Fletcher was of English descent by the father's side; his father being the fifth in the direct line from Sir Bernard Fletcher of the county of York. But his mother was of the royal House of Scotland, the first of the Clackmannan family having been the third son of the Lord of Annandale, Robert de Bruce, grandfather of the great King Robert. Fletcher's father, who died in his childhood, consigned him to the care of Gilbert Burnet, then minister of Saltoun, afterward the well-known Bp. of Salisbury; by whom he was instructed not only in literature and religion, but in those principles of free government of which he afterward became so zealous an advocate. As early as 1681, when he sat in parliament for the first time as commissioner for E. Lothian, Fletcher offered so determined opposition to the measures of the Duke of York (afterward James II.), then acting as the royal commissioner in Scotland, that he found it necessary to retire, first into England, and then into Holland. He there entered into close alliance with the English refugees, who had assembled in considerable numbers; and on his return to England 1683, he shared the counsels of the party of which Russell, Essex, Howard, Algernon Sydney, and John Hampden (grandson of the still more famous patriot of the same name) were the leaders. Though usually regarded as a republican, Fletcher's political creed, like that of Algernon Sydney, approached far nearer to aristocracy than to democracy in the modern

sense; for though he was disposed to restrict the monarchical element of the constitution within the narrowest limits, if not to abolish it altogether he was so far from being an advocate for a universal participation in political rights, that one of his favorite schemes for the reformation of the hosts of vagrants and paupers by whom Scotland was infested in his day, consisted in the establishment of slavery in the form in which it had existed in the classical nations of antiquity. On the discovery of the Rye House plot, Fletcher returned to Holland. His next visit to England was as a volunteer under the unfortunate Duke of Monmouth 1685; but he was compelled to leave the insurgent army, at the beginning of the enterprise in consequence of his having shot the mayor of Lynn, with whom he had had a personal quarrel about a horse. The next-hiding place which Fletcher selected was Spain; but he had no sooner arrived, than he was thrown into prison at the instance of the English ambassador, and would have been transmitted to England, to share the fate of his fellow-patriots, had he not been mysteriously delivered from prison by an unknown friend. From Spain he went to Hungary, where he entered the army as a volunteer, and greatly distinguished himself. He returned to England at the Revolution. A few years later, he met in London, it seems accidentally, the famous William Paterson, founder of the Bank of England, and projector of the Darien Expedition, and it was at Fletcher's solicitation that Paterson went to Scotland, and offered, to the acceptance of his countrymen, a project which he had originally intended should be carried out by the far greater resources either of the trading communities of the Hanse towns, or of the princes of the German empire. The bitterness caused by the treatment which the Darien colonists received at the hands of King William's govt. tended to confirm Fletcher and his friends in their opposition to the Union with England, and led to his delivering in parliament those spirited harangues in favor of an exclusive Scottish nationality, which still stir the blood of his countrymen. After the Union, he retired in disgust from public life, and died in London. Fletcher's writings, originally in the form of anonymous tracts, were collected and reprinted, London 1737.

FLETCHER, Benjamin: colonial gov. of N. Y. 1691-98; gov. of Penn. 1693-95. He received both commissions from William and Mary, that for Penn. being illegally granted. He was imperious, dissolute, avaricious, and reckless, and was charged with secretly encouraging piracy for personal gain. William and Mary seem to have used him for some unexplained purpose as they illegally gave him control of the Conn. militia (which act was nullified by the royal council on appeal) and beside ignoring William Penn's rights in his large colony, supported by an autograph letter a demand on the Penn. assembly by Fletcher for money. Fletcher attempted to establish the Church of

England in New York in spite of the opposition of the citizens, was at length deposed, and was succeeded as gov. by Richard, Earl of Bellomont.

FLETCHER, Giles: abt. 1580-1623; son of Dr. Giles Fletcher, Queen Elizabeth's ambassador to the court of Russia; he was elder bro. of Phineas Fletcher, and cousin to John Fletcher the dramatist. He was educated at Cambridge, entered the priesthood of the Anglican Church, and died at his living at Alderton. His chief poetical work is a sacred poem, entitled *Christ's Victory and Triumph,* which appeared at Cambridge 1610. This poem, once admired, is now unknown to general readers, and is remarkable chiefly for having to some extent molded the majestic muse of Milton. His poems, with those of his father, were edited by Dr. Grosart. 1869.

FLETCH'ER, John (Dramatist): see Beaumont and Fletcher.

FLETCHER, John William (FLÉCHIÈRE, Jean Guillaume de la): 1729, Sep. 12—1785, Aug. 14; b. Nyore, Switzerland: collaborator of the Wesleys. He was educated at Geneva and studied some time for the ministry, but the extreme Calvinistic doctrines of the day led him to abandon his intention and engage in military service, first with the Portuguese and then the Dutch. On the conclusion of peace he went to England, was a tutor till 1755, then joined the Methodist Soc., and 1757 took orders in the Church of England. Declining the offer of a rich parish, he accepted the post of vicar of Madeley and distinguished himself by his zealous labors among a debased and neglected people. A considerable part of his work was done under the auspices of the Countess of Huntingdon, who also appointed him pres. of her theol. school at Trevecca, Wales. He was associated with the Wesley brothers, George Whitefield, and others in founding Methodism, and wrote numerous works, including *Checks to Antinomianism,* published 8 vols., New York.

FLETCHER, Joseph Smith, English journalist and novelist: b. Halifax, Yorkshire, 1863. He has written extensively for newspapers under the pseudonym 'A Son of the Soil,' as well as novels and collections of short stories which have been very popular, and several of which have been widely read in the United States. His published books include: *Anima Christi* (1884); *When Charles the First was King* (1892); *Poems* (1892); *The Quarry Farm* (1893); *The Wonderful Wapentake* (1894); *Where Highways Cross* (1895); *Mistress Spitfire* (1896); *Ballads of Revolt* (1896); *Life in Arcadia* (1896); *At the Gate of the Fold* (1896); *God's Failures* (1897); *The Making of Matthias* (1897); *The Builders* (1897); *The Paths of the Prudent* (1899); *From the Broad Acres* (1899); *Morrison's Machine* (1900); *The Harvesters* (1900); *A Picturesque History of Yorkshire* (1899-1900); *The Three Days' Terror; The Golden Spur* (1901); *Bonds of Steel; The Investigators* (1902); *In the Days of Drake; At the Blue Bell Inn; The*

History of the St. Leger Stakes (1902); *Lucian the Dreamer* (1903); *David March* (1904); *Grand Relations* (1904); *The Threshing-Floor;* etc.

FLETCH'ER, Julia Constance: daughter of the Rev. James Cooley Fletcher, missionary: b. Rio Janeiro, Brazil, 1853; author. She circumnavigated the S. American continent with her father before she was 4 years old, subsequently travelled with him through the United States, France, England, Egypt, and Syria, and since 1874 has resided chiefly in Rome. Her first verses, *Under the Daisies,* were first published in the *Galaxy* magazine when she was 13 years old. Under the *nom de plume* of George Fleming she has published the following novels: *Kismet* (Boston 1877); *Mirage* (1878); *The Head of Medusa* (1880); *Sonnets of Gaspara Stampa* (1881); *Vestigia* (1884); and *Andromeda* (1885); *The Truth About Clement Ker* (1889); *For Plain Women Only* (1895); and *Little Stories About Women* (1897). She has also written the plays: *Mrs. Lessingham* (1894); *A Man and His Wife* (1897); *The Canary* (1899); *The Fantasticks* (1900).

FLETCHER, Lazarus, English mineralogist: b. Salford, England, 1854, March 3. He was educated at Balliol College, Oxford, and has been keeper of minerals in the British Museum from 1880. He has published: *Introduction to the Study of Meteorites* (1881); *Introduction to the Study of Minerals* (1884); *The Optical Indicatrix* (1892); *Introduction to the Study of Rocks* (1895); etc.

FLETCH'ER, Phineas, 1584-1660; younger son of Dr. Giles Fletcher (see Fletcher, Giles). He was educated at Eton and Cambridge, and became rector of Hilgay, in Norfolk, 1621, and died there. His most important poem, the *Purple Island; or the Isle of Man,* was published 1633. contains an elaborate description of the human body and mind—the former being given with great anatomical minuteness. The mind is represented as being beleagured with the vices, and likely to be subdued, when an angel comes to the rescue—the angel being James I. Although formal and pedantic, the *Purple Island* abounds in fine passages, in which the lusciousness of Spenser and the gravity of Milton are curiously mingled. His poetical works were edited by Dr. Grosart, 4 vols. 1868.

FLETCHER, Robert, American surgeon: b. Bristol, England, 1823. He was graduated at the Royal College of Surgeons 1841; came to the United States, and was surgeon of an Ohio regiment during the Civil War. He afterward became principal assistant librarian of the surgeon-general's office at Washington, D. C., and professor of medical jurisprudence in the Columbian University. He has published: *Paul Broca and the French School of Anthropology* (1882); *Human Proportion in Art and Anthropometry* (1883); *The New School of Criminal Anthropology* (1891); *Scopelism* (1897); etc.

FLETCHER, Robert Howe: American soldier and

author: b. Cincinnati, Ohio, 1850, July 21. He entered the United States Naval Academy at 17, and at graduation was transferred to the army where he served on the Indian frontier and in California till 1886. Since 1898 he has been curator of the Mark Hopkins Institute of Art at San Francisco. He has published: *A Blind Bargain; The Johnstown Stage; Marjorie and Her Papa;* etc.

FLETCHER, William Isaac, American librarian: b. Burlington, Vt., 1844, April 28. He has been librarian of Amherst College from 1883 and is the author of *Public Libraries in America* (1895); and was joint editor of *Poole's Index to Periodical Literature.* He has also edited continuations of the latter (1882-1900); the *A. L. A. Index to General Literature* (1893); and the *Co-operative Index to Periodicals* (1883-91).

FLEUR-DE-LIS, n. *flėr-dė-lē'* [F. flower of lily (see under Flower)]: a variety of Iris (q.v.); in *OE., flower-de-luce.* Fleurons, n. plu. *flėr-awng* [F.]: flowers; ornaments.

FLEUR-DE-LIS, *flėr-dė-lē:* the royal emblem of France. Authorities are divided as to whether this celebrated emblem is derived from the white lily of the garden, or from the flag or iris, which, as generally represented, it more resembles both in form and color. 'Ancient heralds,' says Newton (*Display,* p. 145), 'tell us that the Franks of old had a custom, at the proclamation of their king, to elevate him upon a shield or target, and place in his hand a reed or flag in blossom, instead of a sceptre; and from thence the kings of the first and second race in France are represented with sceptres in their hands like the flag with its flower, and which flowers became the armorial figures of France.' However this may be, or whatever the value of the other legendary tales, such as that a blue banner, embroidered with golden fleur-de-lis, came down from heaven; that an angel gave it to King Clovis at his baptism, and the like; there is little doubt that, from Clovis downward, the kings of France bore as their arms first an indefinite number, and latterly three golden lilies on a blue field, or, as heralds would say, azure, three fleur-de-lis, Or.—It was Charles VI. who reduced what had hitherto been the indefinite number of fleurs-de-lis to three, disposed two and one; 'some conjecture upon account of the Trinity, others say, to represent the three different races of the kings of France.'—Nisbet, i. 383. Many English and Scotch families bear the fleur-de-lis in some portion of their shield, and generally with some reference to France.

FLEURUS, *flėh-rūs:* small town of Belgium, province of Hainault, n. of the left bank of the Sambre, 15 m. w. of Namur. It has been the scene of several contests, the last and most important, the battle of Fleurus, 1794, June 26, between the army of the French Republic, 89,000 troops under Jourdan, and the allies, inferior in numerical strength, under the Prince of Saxe-Coburg. The latter

leader gave orders for a retreat at the very moment when a resolute advance might have decided the victory in his favor, and the result was that Jourdan was enabled to unite his army with those of the Moselle, the Ardennes, and the North, and that the allied forces were compelled for a time to evacuate Flanders. Pop. 5,087.

FLEURY, *flėr'ĭ*, or FLORY, or FLOWRY, or FLEURETTE, *flėr-ĕt'*, in Heraldry: term denoting that the object is adorned with fleurs-de-lis; a cross-fleury, for example, is a cross the ends of which are in the form of fleurs-de-lis. There are several varieties in the modes of representing these crosses, which have led to trivial distinctions by heralds, but they all are distinguishable from the cross-potance, or potancée, incorrectly spelled patonce by English heralds. (Mackenzie's *Science of Heraldry*, p. 44.) In the latter, the limbs are in the form of the segments of a circle, and the foliation is a mere bud; whereas the cross-fleury has the limbs straight and the terminations distinctly floriated. Thus—

Cross-potance.

Cross-fleury.

Perhaps the most celebrated instance of this bearing is in the case of the double prepuce flowery and counter-flowery gules which surrounds the red lion in the royal arms of Scotland, and which Charlemagne is said to have conferred on Achaius, King of Scotland, for assistance in his wars. At to this historical occasion some doubt remains, though Nisbet (ii. 101) is extremely positive in asserting it.

FLEURY, *flėh-re'*, CLAUDE: 1640, Dec. 6—1723, July 14; b. Paris: French church historian. He was educated for the law, but subsequently took priest's orders. In 1672, he became tutor to the young Prince de Conti, who was brought up with the Dauphin; and later to the Comte de Vermandois, natural son of Louis XIV. After the death of the Comte, 1683, the French monarch appointed him, under Fénelon, tutor to the Princes of Burgundy, Anjou, and Berri, and abbot of the Cistercian monastery of Loc-Dieu. When the princes had completed their education, Fleury was rewarded with the priorate of Argenteuil. The Duke of Orleans selected him for confessor to the young king, Louis XV., giving as his reason for so doing, that Fleury was neither Jansenist, nor Molinist, nor Ultramontanist, but Catholic. Fleury held this office till 1722, when the infirmities of age compelled him to resign it. Fleury was learned, modest, mild, and kindhearted, simple in manners, and upright in conduct. Among his numerous works are: *Mœurs des Israélites* (Paris 1681); *Mœurs des Chrétiens* (Paris 1662); *Traité du Choix et de la Méthode des Études* (Paris 1686); *Institution au Droit Ec-*

clésiastique (1687); and, above all, the *Histoire Ecclésiastique* (20 vols. Paris 1691–1720). On this work, Fleury labored 30 years. It is marked by great learning, and, on the whole, by a judiciously critical spirit. What may be called his professional sympathies are held in check by a noble desire to be impartial, which might well rebuke the unveracious partisanship of many Protestant writers. Semler (q.v.) eminent German theological professor, avowed that his own lectures were at first mainly extracts from the *Histoire Ecclésiastique*. Even Voltaire praised it. 'The history of Fleury', says he, 'is the best that has ever been executed.' D'Alembert and many others recommend Fleury's style as a model of elegant simplicity. The so-called *Abrégé de l'histoire Ecclésiastique de Fleury*, published Berne 1776, is ascribed to Frederick the Great. A posthumous work of Fleury's entitled *Discours sur les libertés de l'Eglise Gallicane*, has always been very popular.

FLEURY, *fléh-ré*, Louis de, Chevalier and Viscount: b. France, abt. 1740: soldier. He was educated for a military engineer, was a maj. in the French army, came to America soon after the beginning of the revolutionary war, and was given a captain's commission by Washington in person. He served at Fort Mifflin on the Del. river, was presented by congress with a horse for gallantry at Brandywine, was promoted lieut.col. 1777, Nov. 26, was sub-inspector under Gen. Steuben during the winter 1777–8, appointed adj.gen. of Gen. Lee's div., 1778, June 4, was second in command in the R. I. expedition, and commanded a battalion of light inf. under Washington himself. At the storming of Stony Point, 1779, July, he led the van of the right column, was the first to enter the works, and captured the British colors, and for his bravery received the thanks of congress and a silver medal. Subsequently he served under Rochambeau, and returned to France with him.

FLEW, v. *flô:* did fly: see Fly.

FLEWS, n. plu. *flôz* [Low Ger. *flabbe*, the chops, thick lips]: in *OE.*, the chops of a dog; the lateral hanging parts of the upper lips of dogs. Flewed, a. *flôd*, having flews.

FLEX, v. *flĕks* [L. *flexus*, bent]: in *anat.*, to bend or fold up a joint. Flex'ing, imp. Flexed, pp. *flĕkst.*

FLEXIBLE, a. *flĕks'ĭ-bl* [F. *flexible*—from L. *flexĭb'-ĭlĭs*, that may be bent—from *flexus*, bent: It. *flessibile*]: pliant; yielding to pressure; not stiff; obsequious; docile. Flex'ibly, ad. *-ĭ-blĭ.* Flex'ibleness, n. *-ĭ-bl-nĕs*, or Flex'ibil'ity, n. *-ĭ-bĭl'ĭ-tĭ* [F. *flexibilité*]: pliancy; the opposite of stiffness. Flexile, a. *flĕks'ĭl*, easily bent.—Syn. of 'flexible': pliable; supple; yielding; tractable; manageable; ductile; wavering; inconstant; fickle.

FLEXIBLE SANDSTONE: see Itacolumite.

FLEXION, n. *flĕk'shŭn* [F. *flexion*—from L. *flexĭönem*, a bending—from *flexus*, bent]: the act of bending; a double;

a fold (see FLEXURE). FLEXOR, n. *flĕks′ŏr* [L. that which bends or contracts]: a muscle which bends a joint.

FLEXNER, SIMON, American pathologist: b. Louisville, Ky., 1863, March 25. He was graduated from its University of Louisville as M.D. in 1889. He then became a post-graduate student at Johns Hopkins University and subsequently pursued his pathological studies at the University of Strasburg. He was professor of pathology, Johns Hopkins University 1891–8; and of pathological anatomy 1898–9, and has been professor of pathology in the University of Pennsylvania since the year last named. He was also director of Ayer Chemical Laboratory, Pennsylvania Hospital, 1901–3; and pathologist of University Hospital and Philadelphia Hospital 1899–1903. His ability was further recognized by his being chosen in 1902 director of the Rockefeller Laboratory of Research in New York, established to promose the study of the origin of disease. Among his publications are: *The Pathology of Tox-Albumin Intoxication; Micro-organisms; The Bacillus Pyogenes Filiformis; The Aetiology of Dysentery; Terminal Infections; Experimental Pancreatitis; The Nature of Snake Venoms*, and many other papers and monographs relating to bacteriological and pathological subjects.

FLEXUOUS, a. *flĕks′ū-ŭs*, or FLEX′UOSE, a. *-ōs* [L. *flexŭōsŭs*, full of windings, tortuous—from *flexus*, a bending]: winding; unsteady or wavering; in *bot.*, having alternate curvations in opposite directions; bent in a zigzag manner. FLEX′URE, n. *-ūr* [L. *flexūră*, a bending or winding]: also FLEXION, a joint, the part bent; the act of bending; the bending or curving of a line or figure (see CURVATURE). A curve is said to have a point of *contrary* flexure at the point where it changes its character of concavity or convexity toward a given line. In the art of building, flexure denotes the bending of loaded beams. If a beam, supported at its two ends, be loaded, it bends, its lower surface becoming convex, and its upper concave. In this bending, the particles in the lower surface are drawn away from each other, and those in the upper are more closely packed together, while between the surfaces there is a line called *the line of no disturbance*, wherein the particles are neither drawn asunder nor compressed, and from which the mathematical theory of the flexure of beams starts. Experiments show that the flexure of solid beams, supported at their ends, and loaded, varies—(1) directly as the load; (2) inversely as the product of their *breadths*, and the cube of their *depths;* and (3) directly as the cube of the distance between the supports, while the flexure, if the load be uniformly distributed over the beam, is $\frac{5}{8}$ of the amount produced by the load placed on its centre. See STRENGTH OF MATERIALS.

FLICK, LAWRENCE F., American pathologist: b. Carroll Township, Cambria County, Pa., 1856, Aug. 10. He was educated at the Benedictine College near Latrobe, Pa., and was graduated in medicine at Jefferson Medical

College, Philadelphia, in 1879. He took up tuberculosis as a specialty and early in his career began a movement for the prevention of this disease. In June 1888, he read a paper upon the contagiousness of phthisis before the Medical Society of the State of Pennsylvania, showing that houses which had been occupied by consumptives gave the disease to subsequent occupants, and that the malady was essentially a contact disease. He subsequently published many monographs upon this topic, and 1890 started a movement for the establishment of consumption hospitals which culminated in the founding of the Rush Hospital for diseases of the chest. In 1892 he founded the Pennsylvania Society for the Prevention of Tuberculosis, of which he was president for some years. In 1895 he helped to found the Free Hospital for Poor Consumptives and was elected its president. In 1903 he was entrusted with the establishment of the Henry Phipps Institute for the Study, Treatment and Prevention of Tuberculosis and was appointed its medical director. He wrote *Consumption a Curable and Preventible Disease* (1903).

FLICKER, v. *flĭk'ėr* [imitative of a flapping sound: Ger. *flackern*, to flare, to flutter: Dut. *fliggeren*, to flutter: Icel. *flokra*, to flutter]: to twinkle, as a light; to flutter; to waver. FLICK'ERING, imp. FLICK'ERED, pp. *-ėrd*. FLICK'ERINGLY, ad. *-ĭng-lĭ*. FLICK, v. *flĭk*, to whip lightly. FLICKER-MOUSE, a bat; the flitter-mouse or flinder-mouse.

FLIEDNER, *flēd'nėr*, THEODOR, D.D.: 1800, Jan. 21—1864, Oct. 4; b. Eppstein, near Wiesbaden, Germany: philanthropist. He was educated in the universities at Giessin and Göttingen and the theol. seminary at Herborn, was a private tutor in Cologne one year, received a license to preach 1820, and was called to a small Protestant colony at Kaiserswerth, a Rom. Cath. town on the Rhine below Düsseldorf, 1821, Nov. His people were so poor that they could only offer him 180 Prussian dollars per annum, and four weeks after he settled there they were rendered entirely destitute by the failure of a large silk-factory, in which a great portion of them worked. With great diffidence he started on a long journey by foot to raise money to relieve his people and hold them together, and in a single week collected 1,200 thalers. In 1823, June, he made a tour of Holland and England and begged sufficient] money for the permanent endowment of his congregation. While in England, he became intimate with the humane work of Elizabeth Fry, and on his return to Germany visited numerous penal and reformatory institutions; tried alone to remedy the evils prevailing in them, and established the first German soc. for improving prison discipline. He began his work for the reformation of convicts by converting a summer-house in his garden at Kaiserswerth into a home for a discharged and destitute female prisoner anxious to reform. In 1836 he founded the order of Evangelical Deaconesses, a Protestant counter-

part of the Rom. Cath. Sisters of Charity without any ascetic or monastic features, and in its interest visited Holland, England, and Scotland 1832, 1853, the United States 1849, Jerusalem 1851, and the east as far as Jaffa 1857. The deaconesses are divided into two classes, nursing sisters and teaching sisters. Besides the Christian hospitals, scattered through Europe, Asia, and the United States, in 1889 there were abt. 60 houses of Protestant deaconesses with 6,000 sisters—growing monuments to the practical philanthropy of the poor German pastor of Kaiserswerth.

FLIER, n. *flī'ėr* [see FLY]: one who flies; that part of a machine which equalizes and regulates the motion of the whole; a fly-wheel.

FLIES, SPANISH or BLISTERING: see CANTHARIS.

FLIGHT, n. *flīt* [Icel. *flug;* AS. *floc;* Dut. *vleuge,* the act of flying (see FLY)]: a hasty removal; the act of flying or fleeing; a volley or shower, as of darts or arrows; an excursion, as, a flight of the imagination; a mounting; a soaring; an extravagant sally, as of ambition; space passed, as by flying; a flock of birds or winged creatures; birds produced in the same season; a series or range, as stairs; in *OE.,* the anc. sport of shooting with arrows. FLIGHTER, n. *-ėr,* in *brewing,* a horizontal vane revolving over the surface of wort in a cooler, to produce a circular current in the liquor. FLIGHT'Y, a. *-ĭ,* fickle in disposition of mind; somewhat disordered in mind; in *OE.,* fleeting; swift. FLIGHT'ILY, ad. *-lĭ.* FLIGHT'INESS, n. state or quality of being flighty or volatile; levity; giddiness.—SYN. of 'flightiness': lightness; volatility; wildness.

FLIM-FLAM, n. *flĭm-flăm* [a word imitative of the flapping of a loose texture in the wind: Ger. *flimmen,* to gleam; *flimmern,* to glitter, to sparkle]: something made to catch the eye, but having no solidity or substance; a light insignificant thing; mere show and glitter; a trifle; a whim; a freak.

FLIMSY, a. *flĭm'zĭ* [a probable corruption of the imitative word *flim-flam,* idle talk, a trifle: prov. Sw. *flasma,* a scale or splinter: prov. Dan. *flims,* skin of boiled milk: comp. W. *llymsi,* sluggish, spiritless]: denoting something showy and unsubstantial; without solidity, strength, or force; thin or loose of texture; shallow. FLIM'SILY, ad. *-lĭ.* FLIM'SINESS, n. thinness and weakness in texture; want of solidity. SYN. of 'flimsy': superficial; vain; empty; unsubstantial; weak; feeble; light; slight.

FLINCH, v. *flĭnsh* [a nasalized form of *flick:* OF. *flechir,* to bend, to go on one side: Ger. *flink,* smart, brisk: Dut. *flinkeren,* to glitter, to twinkle]: to shrink or draw back, as from pain, suffering, danger, or duty, to fail. FLINCH'ING, imp.: N. a shrinking or drawing back under pain or difficulty. FLINCHED, pp. *flĭnsht.* FLINCH'ER, n. one who. FLINCH'INGLY, ad. *-lĭ.*

FLINDERS, *flĭn'dėrz,* MATTHEW: 1774–1814, July 19; b.

Donington, Lincolnshire: adventurous English navigator, to whom was due the earliest correct knowledge of a great portion of the Australian coasts. He entered the merchant service at an early age, and subsequently the royal navy. In 1795, the vessel in which he was midshipman conveyed the gov. of New Holland to Botany Bay; and while there, Flinders determined to investigate the coast s. of Port Jackson, about 250 leagues of which were laid down in the charts as 'unknown.' With an equally daring and ambitious young surgeon in his ship, named Bass, he departed on the enterprise in a small decked vessel, with a crew of only six men. Their chief discovery was the straits between Van Diemen's Land (now Tasmania) and the mainland of Australia, which were named after Bass. In 1801, Flinders obtained from the British govt. the command of a scientific expedition for the investigation of the Australian coasts and their products. Commencing his examination at Cape Leuwin, Flinders, in the course of two years, gradually explored the coast to Bass's Straits, thence northward—laying down carefully the Great Barrier Reefs—to the Gulf of Carpentaria, which he thoroughly surveyed across to Timur, then back to Cape Leuwin, and round the s. coast to Port Jackson. In 1810 he was liberated from a six years' imprisonment by the French in the Isle of France, returned to England, and gave the world the result of his researches in a work, entitled *A Voyage to Terra Australia*. He died on the day on which his book was published.

FLINDERSIA, n. *flĭn-dėr'zĭ-a* [named after Capt. M. Flinders, R.N., who, accompanied by Robert Brown, botanist, explored the coast of Australia at the beginning of the present century]: genus of *Cedrelaceæ*, tribe *Cedreleæ*. A tree growing in Australia and the Moluccas, with wood little inferior to that of mahogany. The fruit, which is thickly covered outside with sharp pointed tubercles, is used by natives of the Moluccas for rasps to prepare roots for food.

FLIN'DERS LAND: now South Australia (q.v.).

FLING, v. *flĭng* [Icel. *fleygia*, to cast, to fling: Norw. *flengja*, to tear to pieces: Sw. *flinga*, a fragment; *fläng a*, to use violent action]: to cast or throw from the hand; to throw or hurl; to flounce: N. a throw; a cast from the hand: a sneer or sarcasm. FLING'ING, imp. FLUNG, pt. and pp. *flŭng*, did fling. FLING'ER, n. one who. FLINGING-TREE, piece of timber hung by way of partition between two horses in a stable. To FLING AWAY, to waste, as means; to neglect, as opportunities; in *OE.*, to dismiss. To FLING DOWN, to demolish; to ruin. To FLING OUT, to throw out, as the legs, or words incautiously; in *OE.*, to grow unruly. To FLING UP, to relinquish or give up. To HAVE ONE'S FLING, to enjoy one's self to the full. HIGHLAND FLING, a dance of the Scottish Highlanders—the name may be a corruption of *heel and fling*, terms descriptive of the character of the movements.

FLINT, n. *flĭnt* [Ger. *flins* and *flinten-stein*, flint: Dan. *flise*, to split: Icel. *fleinn;* AS. *flan*, an arrow, a dart: Dan. *flint;* Sw. *flinta*, a brick]: a very hard species of stone, generally in nodules and concretions; impure silica; anything very hard. FLINT'Y, a. -ĭ, like flint; hard; obdurate. FLINT'INESS, n. FLINT-GLASS, the fine bright glass used in making decanters, wine-glasses, etc., made from silica, potash, and oxide of lead (see GLASS). FLINT-HEARTED, having a very hard heart; *figuratively*, hard as flint; cruel. FLINT-WORKER, term applied to those men of the palæolithic period, who fashioned the flint implements found in the drift; a man of any savage race that has not yet emerged from the Stone period and attained a knowledge of the use of metals. FLINTY SLATE, an impure quartz, assuming a slaty structure; containing about 75 per cent. of silica, the remainder being lime, magnesia, oxide of iron, etc. Its fracture is rather splintery than shell-like. It is translucent. It passes by insensible gradations into clay-slate, with which it is often in intimate geological connection. Lydian Stone (q.v.) is a variety of it.

FLINT: river of Georgia, uniting on its right with the Chattahoochee, at the s.w. angle of the state, to form the Appalachicola, which, after a course of 100 m., enters the Gulf of Mexico. The Flint itself is about 300 m. long, being navigable for steamboats up to Albany, about 250 m. from the sea.

FLINT: city, cap. Genesee co., Mich.; on Flint river and the Flint and Pere Marquette, and the Chicago and Grand T. railroads; 34 m. s.s.e. of E. Saginaw, 64 m. n.n.w. of Detroit, 66 m. w. of Port Huron. It is prettily laid out on both sides of the river, has broad, regular and well-shaded streets, is lighted with gas and electricity, and provided with ample water, sewage, and fire department system. The public buildings include a handsome brick court-house, co. jail chiefly of iron, city hall of brick, high-school building that cost $150,000, state institution for the education of the deaf, dumb, and blind, masonic temple, and the structures on the fair grounds of the Genesee co. agricultural soc. There are several churches, national bank, and weekly newspapers. The industries are represented by saw mills, breweries, brickyards flouring mills, paper mill, and manufactories of mill and steam machinery, farming implements, furniture, carriages, and woolen goods. Flint was settled 1830, incorporated 1855, and enlarged by annexation 1871. Pop. (1910), 38,550.

FLINT: parliamentary borough and seaport in the e. of Flintshire, N. Wales, formerly cap. of the county, on the left side of the estuary of the Dee, 191 m. n. w. of London by rail, 12½ m. n. w. of Chester. It forms a rectangle like a Roman camp. and is surrounded by now nearly obliterated ramparts and intrenchments. The Dee estuary is some miles wide here, but shallow and narrow at low water. Vessels of 300 tons reach the town. The principal exports are coal and lead from mines in the vicinity, which

afford the chief employment. Roman relics and traces of Roman lead smelting-works have been found here. On a low freestone rock in a tidal marsh are the remains of a castle, built by Henry II., and dismantled 1647. The double tower or keep is 40 ft. in diameter, and includes two concentric walls, each 6 ft. thick, with an intervening gallery 8 ft. broad; within, is a circle 20 ft. in diameter, with four entrances. Deterioration of the channel of the Dee has made Flint in a great degree a port of Chester, and here larger vessels, especially with timber, are discharged, and the cargoes floated up the Dee in smaller vessels, the timber in rafts. Pop. 4,624.

FLINT: a massive variety of quartz, somewhat resembling chalcedony, but more opaque. It is commonly of a gray or smoky-brown color darker in the interior than on the surface, though the color, may vary toward red or yellow. It consists almost entirely of silica, with very little lime and other matter. The coloring matter is chiefly carbonaceous, with some iron sesquioxide, a microscopic examination often shows the remains of diatoms and other minute organisms, from whose silicious skeletons the silica of the flint was doubtless largely derived. In other cases the flint was probably formed by the replacement of lime by silica held in solution by the ground water.

It occurs abundantly in the U. S. and in other countries; in England and France it occurs chiefly in the chalk formations. In the chalk it forms nodules of various sizes, sometimes large nodular masses of irregular, often grotesque shape. Flint is also found in beds or veins. Rolled flint nodules aften occur also in compound rocks, and vast alluvial tracts are sometimes full of them. Flint geodes often contain crystals of quartz. Flint nodules are usually moist in the interior if broken when newly taken from their beds. Flint is sometimes harder than quartz, sufficiently so to scratch it. It breaks with a conchoidal fracture, leaving sharp cutting edges.

The readiness with which it strikes fire with steel is well known, and it seems that the sparks are not all merely incandescent particles, heated by the friction, but that in some of them a chemical combination of silica and iron takes place, causing great increase of heat. The use of the flint and steel for igniting tinder, formerly common, has been almost superseded by that of lucifer-matches, and gun-flints have given place to percussion caps. According to Pliny, Clias was the first who struck fire with flint; or more probably, he was the first to show its application to useful purposes, and he therefore received the name *Pyrodes*. The most ancient use of flint was probably for sharp weapons and cutting instruments; and flint knives, axes, arrow heads, etc., are among the most interesting relics of rude antiquity: see FLINT IMPLEMENTS. At present, a principal use of flint is in the manufacture of fine earthenware, into the composition of which it enters, being for this purpose first calcined, then thrown into cold water and afterwards powdered.

FLINT.

The origin of flint is a difficult question. Silicious deposits are sometimes a purely chemical operation, as in the case of the silicious sinter formed round the geysers of Iceland, from the evaporation of water largely charged with silex. But at the bottom of the sea, as no evaporation could take place, some other agent than springs of water saturated with silex must have supplied the materials. It is a fact of considerable importance in this inquiry, that almost all large masses of limestone have thin silicious concretions, or flints. Thus, chert is found in carboniferous and other limestones, and menilite in the tertiary limestones of the Paris basin. The conditions necessary for the deposition of calcareous strata seem to be those required for the formation of silicious concretions. The materials of both exist in solution in sea-water, and as it needed the for amini fer, the coral, and the mollusk to fix the carbonate of lime which formed the chalk deposits, so the silex was secreted by innumerable diatoms and sponges, and their remains most probably supplied the material of the flint. The discovery by Dr. Bowerbank and other microscopists of the spicules of sponges and the frustules of diatoms in almost every specimen of flint has clearly shown that flint to a large extent, if not entirely, owes its origin to these minute organisms. It is, however, difficult to account for the changes that have taken place in these materials subsequent to their deposition.

FLINT, Austin, M.D., LL.D.: 1812, Oct. 20—1886, Mar. 13; b. Petersham, Mass.: physician and author. He graduated in the medical dept. of Harvard Univ, 1833, practiced in Northampton, Boston, and Buffalo, till 1844; was prof. of the institutes and practice of medicine in Rush Medical College, Chicago, 1844–46; established the *Buffalo Medical Journal* 1846, and was a founder of Buffalo Medical College 1847. During 1847–52 he was professor of the theory and practice of medicine and of clinical medicine at Buffalo, 1852–56 occupied a similar chair in the medical department of Louisville Univ., 1856–58 was professor of pathology and clinical medicine at Buffalo, and 1858–61 (winters) was professor of clinical medicine in the New Orleans Medical School, and visiting physician to the Charity Hospital. He removed to New York 1859 and became professor of pathology and practical medicine in the Long Island College Hospital, professor of the theory and practice of medicine in the medical college of Bellevue Hospital, and visiting physician to the hospital. The former office he held till 1868, the others till death. Subsequently he became consulting physician to the Charity, St. Mary's, and St. Elizabeth's hospitals, and the Hospital for the Ruptured and Crippled. He was pres. of the New York Acad. of Medicine 1872–85, president of the American Medical Assoc. 1884, and delegate to the medical congresses, Philadelphia (international) 1876, London 1881, and Copenhagen 1884; and had been elected president of the one to be held in Washington 1887. He was author of many standard professional works.

FLINT, Austin, Jr., M.D.: prof. and author; b. Northampton, Mass., 1836, Mar. 28. He studied at Buffalo, Harvard Univ., Louisville, and Philadelphia, and graduated at the Jefferson Medical College, Philadelphia, 1857. He became an attending surgeon in the Buffalo City Hospital and professor of physiology in the medical college there 1858, removed to New York with his father 1859, and was elected professor of physiology in the New York Medical College and the New Orleans School of Medicine. He passed a part of 1861 in special study with Charles Robin and Claude Bernard in Paris, and in the same year was elected professor of physiology and microscopic anatomy in the new medical college of Bellevue Hospital, and secretary and treasurer of the faculty. Dr. Flint lectured on physiology in the Long Island College Hospital eight years, and was appointed surgeon-gen. of New York, 1874. His published works include *The Physiology of Man*, 5 vols. (1866–74); *Manual of Chemical Examination of Urine in Disease* (1870, 84), *Text-book of Human Physiology* (1876, 81); *The Source of Muscular Power* (1878); and *The Physiological Effects of Severe and Protracted Muscular Exercise*. His *A New Excretory Function of the Liver* (1869) received honorable mention and a prize of 1,500 fr. from the French Acad. of Sciences.

FLINT, Grover (originally Flint Grover), American writer: b. New York 1867, June 27. He was graduated at Harvard in 1888 and from 1892–4 served in the United States army as cavalryman. In 1896 he went to Cuba and served with a Cuban insurgent army, and returning to the United States, some months later, married a daughter of John Fiske (q.v.). He served in Cuba in the Spanish-American war and subsequently went to the Philippines as a lieutenant of volunteers. He has published *Marching With Gomez, With Historical Introduction by John Fiske*, (1898).

FLINT, James Milton: an American naval officer; b. 1838, Feb. 7, Hillsboro, N. H.; educated in common schools and at the Pembroke Academy; was graduated at the Medical Department of Harvard University, 1860, and appointed assistant surgeon, U. S. N., 1862, Apr. 14. He became surgeon, 1874; medical inspector, 1893; medical director, 1897, June 2. He was connected with the U. S. Fish Commission, 1884–87, and at three different periods, in all about 11 years, with the U. S. National Museum. His sea service extended through 11 years and his shore duty through 19 years. He was retired, 1900, Feb. 7, with the rank of rear-admiral.

FLINT, Timothy: 1780–1840, Aug. 16; b, Reading, Mass. He graduated at Harvard College, and 1802–14 was minister of the Congl. Church in Lunenburg, Mass. He was a missionary for the valley of the Mississippi, 1815–25. Returning to the northern states, published *Recollections of Ten Years Passed in the Valley of the Mississippi* (Boston, 8vo, 1826); also a novel of adventure in the first Mexican

revolution, *Francis Berrian.* In 1828, he issued two works: *A Condensed Geography and History of the Western States in the Mississippi Valley* (Cincinnati, 2 vols. 8vo); and *Arthur Clenning,* a novel (Philadelphia, 2 vols. 8vo). In 1833, he edited several numbers of the *Knickerbocker Magazine,* and was subsequently editor for three years of *The Western Monthly Magazine.* Others of his works, besides novels, are: *Indian Wars in the West* (1833, 12mo), *Lectures on Natural History, Geology, Chemistry, and the Arts* (Boston 1833, 12mo); translation of Droy's *L'Art d'être Heureuse,* with additions by translator; and *Biographical Memoir of Daniel Boone, the First Settler of Kentucky* (Cincinnati 1834, 18mo). In 1835, he contributed to the London *Athenaeum* a series of Sketches of the Literature of the United States. He died at Salem.

FLINT IM'PLEMENTS: believed to have been used by the primitive inhabitants in very many countries, have from time to time been turned up by the plow, dug out from ancient graves, fortifications and dwelling-places, or fished up from the beds of lakes and rivers. They do not differ, in any material respect, from the flint implements and weapons still in use among uncivilized tribes in Asia, Africa, America, and the islands of the Pacific Ocean. The weapons of most frequent occurrence are arrow-heads (see ELF-ARROWS), spear-points, dagger-blades, and ax-heads or Celts (q.v.). The more common implements are knives, chisels, rasps, wedges, and thin curved, or semicircular plates, to which the name of 'scrapers' has been given. There is a great variety in the size and in the shape, even of articles of the same kind, and equal variety in the amount of skill or labor expended in their manufacture. In some instances, the flint has been roughly fashioned into something like the required form by two or three blows; in others, it has been laboriously chipped into the wished-for shape, often one of some elegance. In yet another class, the flint, after being duly shaped, has been ground smooth, or has even received as high a polish as could be given by a modern lapidary. Examples of all the varieties of flint weapons and implements are in numerous collections in the United States, in the British Museum, in the Museum of the Royal Irish Acad. at Dublin, in the Museum of the Soc. of Antiquaries of Scotland at Edinburgh, and above all, in the Museum of the Royal Soc. of Antiquaries at Copenhagen, which is especially rich in this class of remains. See *Catalogue of the Archæological Museum at Edinburgh in* 1856 (Edin. 1859); Wilde's *Catalogue of the Antiquities in the Museum of the Royal Irish Academy* (Dubl. 1857–61); Worsaae's *Nordiske Oldsager i det Kongelige Museum i Kjobenhavn* (Copen. 1859); and Frederic Troyon's *Habitations Lacustres* (Lausanne, 1860).

Geological discoveries have recently invested flint implements with a new interest. At Abbeville, at Amiens, at Paris, and elsewhere on the European continent, flint weapons fashioned by the hand of man, have been found

with remains of extinct species of the elephant, the rhinoceros, and other mammals, in undisturbed beds of those deposits of sand, gravel, and clay to which geologists have given the name of 'the drift.' They resemble the flint implements and weapons found on the surface of the earth, but are generally larger, of ruder workmanship, and less varied in shape. They have been divided into three classes—round-pointed, as in Fig. 1; and sharp-pointed, as in Fig. 2, both being chipped to a

Flint Implements from the Valley of the Somme—Reduced.

sharp edge, so as to cut or pierce only at the pointed end; and oval-shaped, as in Fig. 3, with a cutting edge all round. The first and second classes vary in length from about four inches to eight or nine inches; the third class is generally four or five inches long, but specimens have been found of no more than two inches, and of as much as eight or nine inches. In no instance has any flint implement discovered in the drift been found either polished or ground. The French antiquary, M. Boucher

de Perthes, was the first to call attention to these very interesting remains, in his *Antiquités Celtiques et Anté-diluviennes* (Paris 1847–57). But it has since been remembered that precisely similar implements were found in a similar position at Hoxne, in Suffolk, England, with remains of some gigantic animal, in 1797; and at Gray's Inn Lane, in London, with remains of an elephant, in 1715.

To what age these remains should be assigned, is a question on which geology seems scarcely yet prepared to speak with authority. But, in the words of Mr. John Evans, in his essay, on 'Flint Implements in the Drift,' in the *Archæologia* xxxviii. (Lond. 1860), 'thus much appears to be established beyond a doubt, that in a period of antiquity remote beyond any of which we have hitherto found traces, this portion of the globe was peopled by man; and that mankind has here witnessed some of those geological changes by which the so-called diluvial beds were deposited. Whether these were the result of some violent rush of waters, such as may have taken place when 'the fountains of the great deep were broken up, and the windows of heaven were opened,' or whether of a more gradual action, similar in character to some of those now in operation along the course of our brooks, streams, and rivers, may be matter of dispute. Under any circumstances, this great fact remains indisputable, that at Amiens, land is now 160 ft. above the sea, and 90 ft. above the Somme, has, since the existence of man, been submerged under fresh water, and an aqueous deposit from 20 to 30 ft. in thickness, a portion of which, at all events, must have subsided from tranquil water, has been formed upon it; and this, too, has taken place in a country the level of which is now stationary, and the face of which has been little altered since the days when the Gauls and the Romans constructed their sepulchres in the soil overlaying the drift which contains these relics of a far earlier race of men.' See MAN.

FLINT'SHIRE: maritime county of N. Wales, bounded e. by Cheshire and the river Dee, s. and w. by Denbighshire, and n. by the Irish Sea. The main portion of the county is 25 m. long by 10 broad, and the larger of the two outlying portions, which lies toward the s.e. of the main part, is 10 by 5 m. Flintshire is the smallest of the Welsh counties, its area being only 169,162 acres, of which one-seventh is arable. The coast, 20 m. long, is low and sandy, but on the Dee estuary fertile. A hill-range, parallel to the Dee, runs through the length of the county, and rises in Garreg to 825 ft. Another range along the s.w. border of the county rises in Moel Famma, 1,845 ft. The chief rivers are the Dee, Alyn, and Clwyd. The chief strata are Permian, Carboniferous, and Devonian. Coal, and ores of iron, lead, silver, copper, and zinc are the chief mineral products and exports. The soil is fertile in the plains and vales. Cotton is the main manufacture. The London, Chester, and Holyhead railway skirts the e.

and n. shores. Flintshire sends two members to parliament, The chief towns are Flint, formerly the county town; Mold, St. Asaph, Holywell, Rhyddlan, and Hawarden. Flintshire has traces of Roman lead-mines, is traversed by Wat and Offa's Dykes, and has some ancient castle and ecclesiastical ruins. In Flintshire, in the 7th c., Saxon invaders massacred 1,200 Christian monks of the monastery of Bangor. In 796, the Saxons defeated the Welsh here with dreadful slaughter, which event gave rise to the still popular air of *Morfa Rhyddlan*. Pop. (1901) 81,490.

FLIP, n. *flĭp* [imitative of a smart blow with something thin and flexible (see FLIPPANT)]: a stimulant composed of spirits, ale, sugar, spices, etc., drunk hot.

FLIPPANT, a. *flĭp′pănt* [Icel. *fleipr*, tattle; *fleipinn*, flippant, pert]: heedlessly talkative; fluent and rapid in speech; pert. FLIP′PANTLY, ad. *-lĭ*. FLIP′PANCY, n. *-păn′sĭ*, fluency of speech; heedless pertness.

FLIPPER, n. *flĭp′ėr:* broad fin of a fish; the arm of a seal; the paddle of a sea-turtle.

FLIRT, v. *flėrt* [Bav. *flitschen*, to flap, to flutter; *flitschen*, a young girl: W. *ffrit*, a sudden start or jerk; *ffritten*, a flighty female]: to run and dart about; to coquet with men; to act with giddiness; to toss or throw with a jerk: N. a darting motion; a pert giddy girl; a coquette: ADJ. in *OE.*, pert; wanton. FLIRT′ING, imp. ADJ. jerking; darting about; giddy; coquettish. FLIRT′ED, pp. FLIRTATION, n. *flėr-tā′shŭn*, act of flirting; attempt to attract the notice and admiration of men; coquetry. FLIRT′INGLY, ad. *-lĭ*.

FLISK, v. *flĭsk* [imitative of the sound of a cut with a switch]: to flick with a whip; to skip; to bounce. FLISK′ING, imp. FLISKED, pp. *flĭskt*.

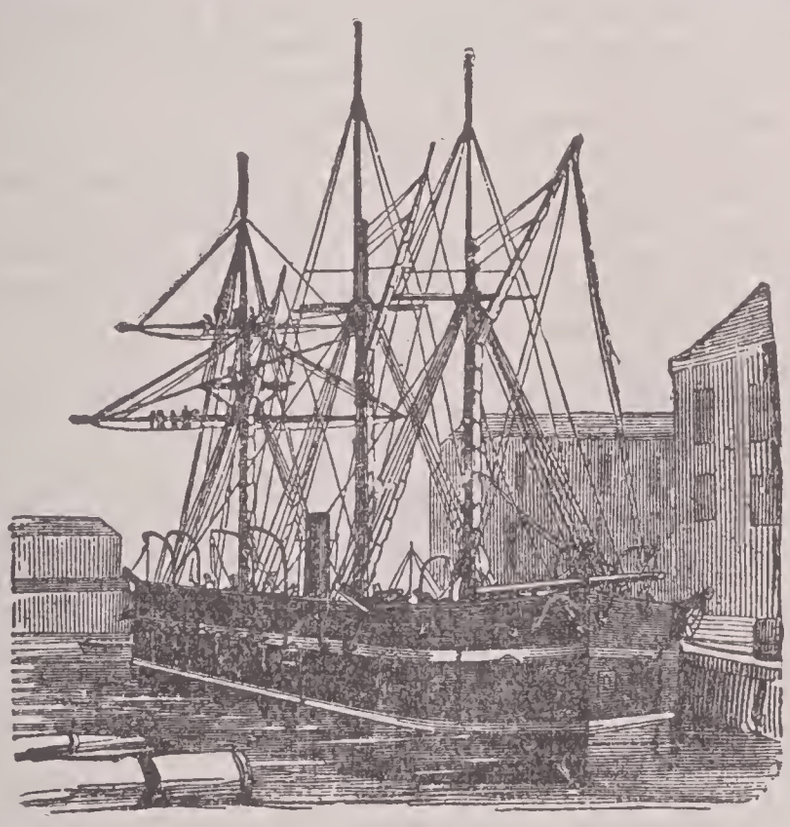
FLIT, v. *flĭt* [Dan. *flytte;* Sw. *flytta*, to remove: Low Ger. *flitzen*, to move rapidly: Icel. *flytja*, to carry, to cause to flit: Bav. *fletzen*, to change one's abode]: to fly about with rapid motion; to dart along; to flutter on the wing; to remove; to migrate: ADJ. in *OE.*, swift; quick. FLIT′TING, imp.: N. a flying with celerity; a fluttering; in *Scot.*, a removal from one house to another. FLIT′TED, pp. FLIT′TINGLY, ad. *-lĭ*. FLITTER-MOUSE, same as flicker-mouse.

FLITCH, n. *flĭch* [OF. *fliche*, a flitch of bacon: Icel. *flicki*, a large lump of flesh: Low Ger. *flicken*, a piece]: the side of a hog salted and cured.

FLITE, or FLYTE, v. *flīt* [AS. *flitan*, to scold: O. H. G. *flizan*, to strive, to contend: Icel. *fljotr*, quick, ready; *flyta*, to hurry on]: in *Scot.*, and *prov. Eng.*, to quarrel; to scold; to censure severely. FLYT′ING, imp.: N. the act of scolding. FLAYT, pt. and pp. *flăt;* also FLET, pt. and pp.

FLITTERN, n. *flĭt-tėrn* [etym. doubtful]: term applied to the bark of young oak trees, which is more valuable for tanning than that of old trees.

FLOAT, v. *flōt* [AS. *fleotan*, to float: F. *flotter*, to float—from L. *fluctus*, a wave: Icel. *flot*, the act of swimming: *fliot*, a river; *fliotr*, swift (see FLEET 1 and 2)]: to swim on the surface; not to sink; to move lightly and irregularly, as through the air; to cover with water; to give buoyancy to; to set agoing and give a start to, as to *float* a company: N. anything used to buoy up something else; the cork or quill used on a fishing-line; in *OE.*, *flote* for *float*, a wave. In processions, a vehicle covered with a platform on which there is an appropriate display. FLOAT'ING, imp.: ADJ. lying on the surface of water, or in air; free or loose to to be used as occasion requires, as capital. FLOAT'INGLY, ad. *lĭ*. FLOAT'ED, pp.: ADJ. made known to the public in order to invite subscribers, said of a loan or a company. FLOAT'ABLE, n. *-ă-bl*, that may be floated. FLOAT'ER,



Floating Battery used in the Russian War, 1854-1855.

n. *-ėr*, he or that which. FLOAT'ERS, n. plu. *-ėrz*, in *slang*, exchequer bills and unfunded stocks in general. FLOAT'AGE, n. *-āj*, that which floats. FLOATATION, n. also spelled FLOTATION, n. *flō-tā'shŭn*, the act of floating; the science of floating bodies. FLOAT-BRIDGE, a bridge of rafts or boats floating on the water. FLOATING LIGHT, a ship in a fixed position bearing a light; any floating vessel bearing a light. FLOAT-BOARD, one of the boards of a water-wheel, or of a steamer's paddle-wheels. FLOAT-GOLD, gold so finely crushed that it remains in suspension in the water, and hence is liable to be lost in the ordinary stamp-mill process. FLOAT-ORE, water-worn particles of ore; fragments of vein material found on the surface away from the vein outcrop. FLOAT-STONE, a variety of quartz.

consisting of fibres—delicate crystals—aggregated so that the whole mass is sponge-like, and so light, owing to the air confined in the interstices, as to float for a while on water: it is found in a limestone of the chalk formation near Paris, in imbedded masses, or incrusting flint nodules. FLOATING DEBT, debt not funded. FLOATING CAPITAL capital employed in business, but of uncertain amount.

FLOATING BAT'TERY: a hulk, or raft, heavily armed, and made as invulnerable as possible, used in defending harbors, or in attacks on marine fortresses. The most remarkable instance of their employment was by the French and Spaniards against Gibraltar, in the memorable siege, 1779, July—1783, Feb., when ten of these vessels, carrying 212 large guns, were brought to bear on the fortress; they had sides of great thickness, and were covered with sloping roofs, to cause the shot striking them to glance off innocuously. But their solidity and strength did not prevent their destruction with red-hot cannon-balls. Steam floating batteries of iron were constructed for the war with Russia 1854, both by the British and by the French governments; but, they have since been generally discarded for other than purely defensive purposes, as too cumbrous for navigation, and too suffocating from the smoke that collected between their decks during action. They are superseded for all purposes of attack and defense by armor-clad vessels, and Turret-ships (q.v.).

FLOAT'ING DOCK: great frame or coffer (or series of coffers) to receive a vessel which is then lifted by it to expose the bottom for repairs. So long as ships were small, repairs on their hulls were effected by the easy method of laying them on any convenient beach or sandbank at high water. The receding tide would leave them high and dry with bottom exposed for a few hours at a time. Even now this plan is frequently resorted to, the beach which is to receive the vessel being laid with parallel rows of timber beams, called collectively a *gridiron*. But the rise and fall of the tides is in many places insufficient to leave the hull dry at low water, and the larger the ship the greater the risk of 'beaching'. Numerous other modes have been

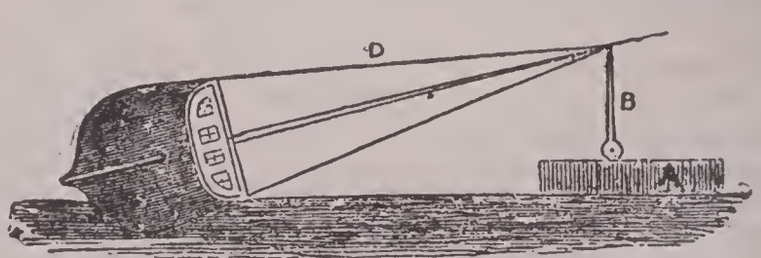


Fig. 1.

adopted. Fig. 1 represents a mode of heeling over ships which was at one time much used. A is a lighter of sufficient size and weight, provided with very powerful 'heaving-down tackle', consisting of strong ropes, B. passing through very large blocks. These tackles are made

fast to the masts of the vessel, which are previously secured by extra stays, on the upper side at D; and then, by working the tackles, the hull of the vessel is heeled over until it assumes the position shown in fig. 1. This plan necessitates the removal of the whole cargo. When there is no rise and fall of tide, the lighter, A, is not required, as the tackle, B, can be made fast to the quay or pier. It was while being careened over that the *Royal George* went down at Spithead, England 1782, with 600 men on board. Graving or Dry Docks (see Dock) offer a very easy plan for repairing ships; but they are always very costly. Another common method is by bringing ships on to sloping ways, called *slips*, carried out from the yard a long distance under water, and then hauling them up on the shore end of the ways by tackle, generally worked by hydraulic power (see Slip). During the operation, the vessel rests upon a suitable carriage.

Floating docks have been in use for many years: for-

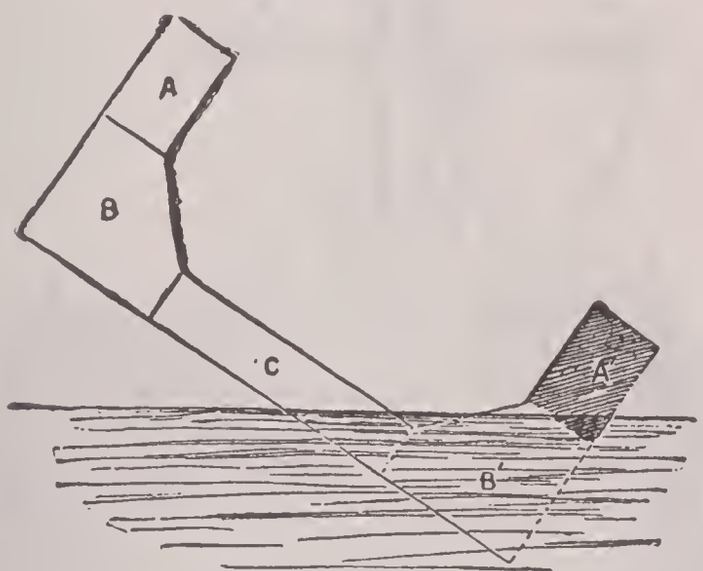


Fig. 2.

merly they were of timber in the form of a large box with a flap-door falling down on strong hinges at one end. They are moored in still water, with a depth just sufficient to allow the vessel to float into them as they rest on the bottom. The flap-door is then raised up, and the water pumped out; whereby the floating dock rises, and lifts the slip. These timber docks were not always efficient or even safe. Many (some in sections), of size sufficient to dock large vessels, have been built in the United States.

Iron is now the material preferred for these constructions. R. W. Thomson, C. E. of Edinburgh, designed 1859 a great iron floating dock for the port of Sourabaya, Java. It consisted of more than 75,000 separate plates, ribs, and angle-irons, every one having been beforehand shaped, punched with numerous holes, and ready in every respect to be riveted into its place. The holes punched numbered two millions. Fig. 2. represents an end view of this dock. The water-tight compartments, A, A′, B, B,′

and C, all were completely under the command of the powerful centrifugal steam-pumps, so that they could be separately filled or emptied in a very short time. In fig. 2, the dock is shown heeled over to one side, giving access to its bottom for repairing or cleaning: this tilting over could be accomplished by filling the compartment A′, and emptying all the others. The water-tight compartments were divided in their longitudinal direction into five separate divisions, making in all 25 water-tight compartments, any one of which could be filled or emptied at pleasure; thus affording complete command over the dock, and admitting of its being put into any required level notwithstanding any irregularity in the distribution of the weight resting on the dock.

Fig. 3.—Floating-dock at Saigon, with the *Persévérante* of 70 guns. (From a Photograph.)

Floating docks require engineering skill for their management, and, unless carefully managed, are liable to serious accidents. Some have been wholly lost; one erected at Rio Janeiro proved unmanageable, and was never used; and a fatal disaster occurred in connection with one at Callao. To overcome such disadvantages, Edwin Clark invented the Hydraulic Lift Graving Dock, London. It consists of a pontoon, filled with water, and sunk between two rows of iron columns; and the pontoon, when the vessel has been placed over it, is raised by hydraulic pumps acting on the pontoon by chains. On this, and on Floating Docks, see the *Proceedings of the Inst. of Civil Engineers*, xxv. xxxi.

Fig. 3, is a view of the dock at Saigon in Cochin China, constructed by the French govt. and put together nearly in the same way as that at Sourabaya. Its performances

are in every way satisfactory; it has lifted, high and dry out of the water, the 70 gun frigate, *Persévérante*. As the Callao Dock floats in an open roadstead, some apprehension was felt that the swell would cause too much movement to admit of ships being safely docked, but it has done its work in the most satisfactory way. None of these iron docks have doors or gates for excluding the water. The bottom part is made of sufficient buoyancy to float the vessels clear out of the water, and the equilibrium of the dock is maintained during the time it is under water, for the purpose of admitting a vessel, by the great displacement offered by the hollow sides, AA′ (fig. 2).

One of the most remarkable of recently constructed floating docks was that sent out to St. Thomas (W. Indies) 1867, designed by Frederick J. Bramwell. It is 300 ft. long, 72 ft. wide clear between the sides, and has a double bottom 9 ft. 9 in. deep. The sides are open girders, not hollow boxes, as in the Sourabaya dock, and immense rectangular air-vessels called 'floats,' each about 47 ft. × 11 ft. × 5 ft., are placed between the side girders, and are capable of being moved up and down by screws to preserve the stability of the whole while it is being raised or lowered. By an accident soon after its arrival at St. Thomas, this dock was sunk, and a hurricane which followed close on its sinking, injured it still further. It remained under water for a long time, but was raised to the surface 1871, after operations which lasted a year and a half. The lifting power of the dock is given at 8,357 tons. A dock sent to Bermuda about the same time, had a lifting power of 16,700 tons, and was 381 ft. long. The docks made by Messrs. Rennie for Cartagena, and Ferrol have been very notable and successful. The former weighs about 4,400 tons, and has lifted the Spanish ironclad *Numancia*, weighing 5,600 tons, and supported it for 80 days. It is credited with a total lifting power of 11,500 tons; while that at Ferrol should sustain a weight of no less than 13,040 tons. See Dock; Camel; Pontoon.

FLOATING HOUSES: for examples see Bangkok.

FLOATING ISL'ANDS: found in some lakes, and more rarely in slow and placid rivers. Some are formed by the detachment of portions of the bank; the interlaced roots of plants forming a fabric sufficiently strong to endure the occasional buffeting of waves, and to support soil for herbage or even trees to grow in. Floating islands formed sometimes by aggregation of drift-wood in the creeks and bays of tropical rivers, and wafted into the channel of the river when it is flooded or by the wind, are carried down to the sea, with the soil that has accumulated, and the vegetation that has established itself upon them. They are sometimes seen 50 or 100 m. from the mouth of the Ganges, with living trees standing erect upon them. Portions of the alluvial soil from the deltas of rivers, held together by the roots of mangroves and other trees, are sometimes carried out to sea after typhoons or hurricanes, in-

volving ships in unexpected dangers. Imagination has always invested with a peculiar interest the

> Straggling plots, which to and froe doe rome
> In the wide waters;

and ancient legend did not fail to notice the floating islets of the sacred Vadimonian Lake, which were large enough to bear away cattle that were tempted upon them by their fresh, green grass; and the island of the Cutilian waters, which carried on its surface a dark and gloomy grove, and was constantly changing its place. A small lake in Artois, near St. Omer, is remarkable for the number of its floating islands, as are also the marshy lakes of Comacchio near the Gulf of Venice. Among the largest in the world are those of the Lake of Gerdau, in Prussia, which furnish pasturage for 100 head of cattle; and that of the Lake of Kolk, in Osnabruck, which is covered with beautiful elms. Loch Lomond, in Scotland, was long celebrated for its Floating island, which has long since subsided and become stationary. Floating islands are found in some lakes of Scotland and Ireland, and consist mostly of large floating masses of peat. More interesting to the scientific inquirer, as presenting a phenomenon not so easily explained, are those floating islands which from time to time appear and disappear in the same spot, of which there is one in the Lake of Derwentwater in Cumberland, England; one in the Lake Ralang in the province of Smalande in Sweden; and one in Ostrogothia. The marshy ground of the vale of Cashmere, and particularly around the city of Cashmere, containing many lakes, and liable to inundations, exhibits a peculiar form of human industry in its numerous FLOATING GARDENS, chiefly for the cultivation of cucumbers, melons, and water-melons. These floating gardens may be described as portions of the marshy ground artificially made to float, by cutting through the roots of the reeds, sedges, and other plants about two ft. below the surface, upon which mud is then spread. The floating of the garden secures the soil and crop from destruction by inundations. Floating gardens are said to have existed on the Lake of Mexico before the Spanish conquest. The Mexicans had made great progress in the art of gardening, particularly in the cultivation of flowers, which were much used in their festivities and in their worship. How they were induced to attempt the formation of floating gardens, and at what period it was first done, are unknown. The shallowness of great part of the lake was favorable to the attempt, and perhaps the gradual receding of its water may be reckoned among the reasons of the gradual diminution of the number of the floating gardens which have almost ceased to be reckoned among the wonders of the world. The Abbé Clavigero, in his *History of Mexico*, describes them as formed of wickerwork, water-plants, and mud; as sometimes more than 20 poles in extent; the largest commonly having a small tree in the centre, and sometimes a hut for the cultivator; and as employed for the cultivation of flowers and

culinary plants. Humboldt confirms this description, but states that the real floating gardens, or *chinampas*, are rapidly diminishing in number. The existing *chinampas* are in general not floating gardens, but plots of ground with very wide ditches between them, formed by heaping up earth from the ditches in the swamps or shallows at the side of the lake. Floating islands at mouths of rivers have an important function recognized in science, in carrying animals and plants from land to land: see Wallace's *Island Life* (1880).

FLOAT'ING WARE'HOUSES: magazines for storage on water of petroleum and other dangerously inflammable and explosive chemicals. Such constructions are used in France, and can be moored at a distance from buildings on land, and can be towed as desired. These were made of hollow iron cylinders, placed upright in four rows of 25 each, all lashed together, to form a raft. Each cylinder was designed to contain 25 tons of material.

FLOATSAM: see under FLOTAGE.

FLOBECQ, *flō-běk':* small town of Belgium, province of Hainault, 20 m. n.e. of Tournai. It has extensive manufactures of linens, has breweries, salt-works, oil and flour mills, and has two fairs annually. Pop. 6,000.

FLOCCILLATION, n. *flŏk'sĭl-lā'shŭn* [L. *floccŭlus*, a small lock of wool—from *floccus*, a lock of wool (see FLOCK)]: a picking of bed-clothes by a sick person, an alarming symptom. FLOCCOSE, a. *flŏk-kōs'*, in *bot.*, covered with wood-like tufts. FLOCCOSE'LY, ad. *-lĭ*, in a tufted manner. FLOCCULENT, a. *flŏk'kū-lĕnt*, coalescing and adhering in flocks or flakes: having the appearance of flocks or flakes. FLOC'CULENCE, n. *-lĕns*, the state of being flocculent. FLOCCULUS, n. *-lŭs*, in *anat.*, the subpeduncular lobe on the under surface of the cerebellum. FLOCCUS, n. *flŏk'kŭs*, FLOCCI, n. plu. *flŏk-sī*, in *bot.*, wooll' filaments like hairs or threads; a tuft of hair terminating a tail.

FLOCK, n. *flŏk* [Icel. *flokkr;* Dan. *flok;* Sw. *flock*, a flock: L. *floccus;* It. *flocco;* F. *floc*, a lock or flock of wool: Norw. *flokk*, a heap, a collection, a family, *flokje*, a knot, a bunch: AS. *floc*, a flight]: a company or collection, as of sheep or birds; a lock or flake of wool; a Christian congregation in relation to their pastor; V. to gather in flocks or crowds; to crowd together. FLOCK'ING, imp. FLOCKED, pp. *flŏkt*. FLOCKY, a. *flŏk'ĭ*, abounding with flocks or little woolly tufts. FLOCKS, or LOCKS, material for mattresses and beds, consisting of the waste wool thrown off in the process of manufacture. *Note.*—Both in this and the preceding entry the primary idea seems to be 'a coherent mass, a heap, a collection'.

FLODDEN, *flŏd'dĕn*, BATTLE OF: between James IV. of Scotland, and the Earl of Surrey, of England, 1513, Sep. 9. A 'perpetual peace' had been concluded between England and Scotland, 1502, Jan. 24. In a few years a

series of petty quarrels had weakened this peaceable arrangement; and in 1513, on the invasion of France, Scotland's ancient ally, by Henry VIII. of England, a war broke out between the two countries. James IV., the chivalrous but rash king of Scotland, summoned the whole array of his kingdom to meet on the Borough or Common Moor of Edinburgh, which extended from the s. walls of the city to the foot of the Braid Hills, and which was then 'a field spacious, and delightful by the shade of many stately and aged oaks.' Here an army, it is said, of 100,000 men assembled. With this force James crossed the border 1513, Aug. 22; but instead of advancing at once, and achieving a decisive success, he lingered in the neighborhood of the Tweed until his army had become reduced by desertion to about 30,000 men. On Sep. 6 James took up his position on Flodden Hill, the last and lowest eminence of the Cheviots toward the n.e. On the morning of the 9th, the Earl of Surrey, lieut.-gen. of the northern counties of England, at the head of an army of about 32,000 men, advanced from the s. e., crossed the Till by a skilful and unexpected movement, and thus cut off all communication between King James and Scotland. While the English were crossing the Till, the Scots might have attacked them with every chance of success; their neglect of this opportunity was the first great mistake of the battle. Observing that the English were aiming at a strong position n.w. of Flodden Hill, James, having ordered his tents to be set on fire, advanced against them in battle-array. The two armies were drawn up in similar order, each consisting of a centre, a right and left wing, and a reserve behind the centre. At about four o'clock on Friday, Sep. 9, the battle commenced with cannonading on both sides. The Earls of Huntly and Home, who commanded the left wing of the Scottish army, charged the English right, led by Sir Edmund Howard, and entirely defeated it. Instead of following up their success, Home's borderers commenced pillaging the baggage of both armies; and Huntly, after his first charge, is said to have left the field. On the Scottish right, the clansmen under Lennox and Argyle, goaded to fury by the English archers, rushed forward, heedless of order, and fell with the greatest violence upon their opponents, who, however, received them with wonderful intrepidity and coolness, and at length put them to flight with great slaughter. Meantime, a desperate, resistance was being made by the Scottish centre, where the king fought on foot among his nobles. Scottish history presents no instance in which the national valor burned with a brighter flame than in this. Hemmed in by outnumbering enemies, the king among his slender group of lords fought manfully until, when the night was closing on Flodden, he fell pierced by an arrow, and mortally wounded in the head. The hill was held during the night by the Scots; but at dawn, learning the state of matters, they abandoned their position. Their loss was from 8,000 to 10,000 men 'Scarce a Scottish family of eminence',

says Scott, 'but had an ancestor killed at Flodden'. Besides the king, the Abp. of St. Andrews and 12 earls were among the slain. The English loss amounted to 6,000 or 7,000; but Surrey's victory was so nearly a defeat that he was unable to prosecute the war with any vigor. The sixth canto of Sir Walter Scott's poem of *Marmion* contains a magnificent, and in the main accurate, description of the battle.

FLODOARD, *flo-do-ârʹ*, or FRODOART *fro-do-ârʹ:* 894–966; b. Epernay, France: chronicler. He was educated for the priesthood at Rheims, became canon in the cathedral there, was imprisoned for opposing the interference of the civil power with the affairs of the church; and spent the latter part of his life in study and writing in a monastery of which he had been appointed abbot. His works comprise *Histoire de l'eglise de Rheims; Chronique Sacrée*, a poetical history of Jesus Christ and leaders in the church; and *Chronicon Rerum inter Francos gestarum*, an invaluable chronicle of events in France 919–966.

FLOE, n. *flō* [Icel. *flaga*, what separates as a splinter; Icel. *flot*, what swings on the surface (see FLAG 4)]: a low flat mass or collection of floating ice in the ocean.

FLOETZ, a. *flĕts* [Ger. *flötz*, a layer or stratum]: in *geol.*, in flat horizontal beds.

FLOG, v. *flŏg*, [imitative of the sound of a blow: L. *flagel'lum*, a scourge: Low Ger. *flogger*, a flail]: to beat; to whip; to lash. FLOG'GING, imp.: N. a whipping, as a punishment. FLOGGED, pp. *flŏgd.*

FLOG'GING, ARMY AND NAVY: form of corporal punishment from time immemorial in the British army and navy; formerly inflicted on slight occasion, and often with barbarous severity; abolished 1881. When a soldier on active service is now guilty of a punishable offense, he is awarded such summary punishment, other than flogging, as may be directed by rules made from time to time by one of her majesty's principal secretaries of state; and such summary punishment is to be of the character of personal restraint or of hard labor, but not of a nature to cause injury to life or limb, and is not to be inflicted when imprisonment can be employed with due regard to the public service. A few capital offenses, in the military service of all countries, are punishable with death.

In the French army corporal punishment is not recognized, as French soldiers are drawn from all ranks of society, and have on an average, a higher moral tone than the British recruits, who volunteer usually from the lowest orders. On the other hand, the discipline in the French army, and especially during war on a foreign soil, is admitted to be inferior to the strict rule among British troops. The French soldier, though escaping the ignominy of personal chastisement, is governed by a code harsher than British army regulations as actually administered; and the punishment of death, scarcely known in the British or the United States service during peace, is not unfrequently visited in France upon offenders against discipline.

In the U. S. army and navy, flogging was long ago discontinued. The discipline and penalties are generally similar to those in the British service.

FLOOD, n. *flŭd* [Goth. *flodus;* Icel. *flod;* Sw. *flod*, a flowing water: Icel. *flœda;* Sw. *floda*, to inundate]: a great flow of water; a body of water overflowing land, as from a river; abundance: V. to deluge; to overflow. FLOOD'ING, imp. overflowing: N. an extraordinary uterine flow of blood. FLOOD'ED, pp. FLOOD-TIDE, the rise and flow of the tide. The FLOOD, the great deluge in the time of Noah. FLOOD-GATE, a gate to be opened for the flow of water, or to be shut to prevent its flow. FLOOD-MARK, the line to which the tide rises. FLOOD-PLAIN, land along a stream, so little higher than the usual level of the water as to be often overflowed and thereby slowly raised by the fluvial deposits.

Floods in History.—The following list comprises the most notable floods:

1396. Holland; islands of Texel, Vlieland, and Wieringen separated from mainland, and Marsdiep, the channel between Texel and North Holland, formed.

1421 or 1446. Holland; 72 villages inundated, of which 20 permanently, about 100,000 persons drowned, Biebosch formed E. of Dordrecht, and this town separated from mainland.

1521. Holland; 100,000 lives lost by an inundation.

1570. Holland; storm drove in the sea, destroying numerous villages and 20,000 people in Friesland.

1617. Catalonia, Spain; 15,000 perished in floods.

1629. Mexico (city) inundated.

1642. China, at Kaifong; 300,000 drowned.

1646. Holland and Friesland inundated; loss of life, 110,000.

1726. Floods and inundations all over Europe.

1745. Peru; Callao destroyed by irruption of sea caused by earthquakes.

1767. England; irruption of sea on e. coast.

1782. Formosa; w. side of island submerged, and Taiwan destroyed.

1787–1788. India, in northwestern provinces and Punjab; 15,000 lives lost by floods.

1791. Cuba; floods from excessive rain; 3,000 drowned.

1811. Hungary; 24 villages swept away by overflow of Danube.

1813. Austria, Hungary, Poland, and Prussian Silesia; floods caused by rains; 4,000 perished in Poland, 6,000 in Silesia.

1816. Germany; Vistula overflowed; great loss of life and property.

1819. England; 5,000 acres deluged in the Fen counties.

1824. St. Petersburg and Cronstadt; 10,000 lives lost from overflow of Neva.

1825. Denmark; sea broke through from North Sea

to Limfjord, making northern Jutland an island; one-third of Friesland submerged by rising of sea and rivers.

1829. Germany; dikes of the Vistula broke at Danzig, destroying many lives and much property.

1830. Vienna; dwellings of 50,000 under water.

1833. China; Canton, inundations from incessant rains; similar calamity in other parts of China.

1840. France; overflow of Saone and Rhone, swept away many villages and inundated Lyons, Avignon, Nimes, Marseilles, etc.

1846. France; inundations in the center and s.w.

1849. New Orleans, La.; great inundation; 1,600 houses flooded.

1851. Northern China; Yellow river burst its banks, and made a new outlet into Gulf of Pechili.

1852. Floods throughout Europe from Belgium to Switzerland.

1856. S. of France; floods did damage to extent of $28,000,000.

1864. Sheffield; bursting of the Bradfield reservoir; about 250 drowned.

1866. England, Yorkshire, Lancashire, Derbyshire, Leeds, Manchester, Preston, Wakefield; many lives lost.

1868. Peru; Arica and Iquique nearly destroyed by earthquake waves.

1874. Mill river valley (Massachusetts) inundated by bursting of a dam; 144 drowned. Also floods in western Pennsylvania; 220 drowned and in Eureka, Nevada; through rain and a waterspout.

1875. Disastrous floods throughout central Europe, in the United States, Burma, India, and West Indies.

1876. China; floods in northern provinces; in Bengal 200,000 persons perished from inundation of a tidal wave.

1879. Hungary, Szegedin; bursting of the dams of the Theiss; town nearly destroyed; 77 drowned; also in Spain, Murcia; floods from excessive rains; 1,000 drowned; and in Iowa, Kansas, Minnesota, and Missouri.

1881. Ohio and Mississippi valleys flooded; many drowned.

1883. Java and Sumatra; parts; submerged by volcanic wave. Also floods in Cincinnati, Kentucky, Ohio, and Pennsylvania.

1886. New England, New York and Pennyslvania; great loss of property; also in Galveston, Tex.

1887. China; the Hoang-ho in Ho-nan; millions of lives lost.

1889. Johnstown, Pa.; reservoir burst; 2,209 lives lost.

1891. Consuegra, Spain; 1,200 lives lost.

1893. Queensland; great destruction of property.

1900. Galveston, Tex.; 7,000 lives and $30,000,000 of property lost, from hurricane and flood.

1901. West Virginia; cloudburst and great destruction of life and property.

1903. Great rising of the Kansas, Missouri, Mississippi and Des Moines rivers; Kansas City, Topeka, Des Moines and other cities inundated; loss of life over 300; loss of property about $10,000,000.

1903. Cloudburst, Clifton, S. C.; 50 lives lost; damage $3,500,000.

1903. Cloudburst, Heffner, Ore.; 500 lives lost; damage $1,000,000.

1903. Flood, Paterson, N. J.; damage $3,000,000.

1906. Flood in Pittsburg, Pa. and vicinity; damage about $10,000,000.

FLOOD, *flŭd*, HENRY: Irish politician and orator: 1732—1791, Dec. 2; son of a chief justice. He studied at Dublin and Oxford, and soon obtained a seat in the Irish parliament. He was a powerful and effective speaker, and was made a privy councilor. This and his public offices he resigned, to devote himself to the popular party. He aimed at a higher degree of Irish independence than even Grattan demanded, with whom he quarrelled seriously. In 1783, Flood sat for Winchester in the English house of commons.

FLOOK, n. *flôk* [Ger. *fluhen* and *anker-fliegen*, the flooks of an anchor—from Bav. *flug;* Low Ger. *flunke*, a wing: Dan. *flig*, a flap]: that part of an anchor which catches the ground, usually spelled FLUKE.

FLOOKEN, n, or FLUKAN, n. *flôk'ăn:* a miner's term for a soft clayey substance occasionally found in cross-courses and slides. FLOOK'ING, n. same meaning.

FLOOR, n. *flōr* [AS. *flor;* Dut. *vloere*, a floor· Ger. *flur*, a tract of flat country: W. *llawr*, the ground: L. *lar*, a hearth]: that part of a house or room on which we walk; a story; a series of rooms on the same level: V. to lay with a floor; to knock down; to silence an opponent. FLOOR'ING, imp.: N. a platform: pavement; material for floors. FLOORED, pp. *flōrd, colloquially*, overcome or exhausted, as by trouble or fatigue. FLOOR'ER, n. *-ėr*, a blow which knocks down; an argument or question which stuns or silences.

FLOOR-CLOTH (in the United States called usually OIL CLOTH): coarse canvas coated on both sides, and partly saturated with thick oil-paint, one side having usually a colored pattern printed in oil-paint. The canvas basis is required to be without seam, and of sufficient width to cover considerable spaces of flooring; hence special looms are required for weaving it. It is 18 to 24 ft. in width, and in lengths 100 to 113 yards. The first step toward converting this canvas into floor-cloth consists in stretching it on a frame, sometimes 100 ft. in length by 24 ft. in height, over which the canvas must be stretched as tight as a drum. The back or plain side of the cloth is first operated upon, by *priming* it with a solution of size, and scouring it with pumice. The object of this is to prevent too much of the paint from penetrating the canvas, and rendering it brittle, and to make an even surface to receive the paint, which is

mixed with linseed oil, with very little or no turpentine, and is consequently thicker than common paint. This is thrown or splashed upon the surface with a brush; and then with a long steel trowel the workman spreads the dabs of paint, and produces a moderately smooth surface. This *trowel-color* is left for 12 or 14 days to dry, and then another coat is laid on in a similar manner; and this completes the back or under side of the floor-cloth. While the first coat of the back is drying the front is *primed* and pumiced, and a coat of trowel-color laid on. As more care is required on this side, this coat of color is scoured quite smooth with pumice, and two more trowel-colors are added, and each scoured like the first. Another coat is now carefully laid on with a brush, and is called a *brush color*. This forms the ground on which the pattern is to be printed.

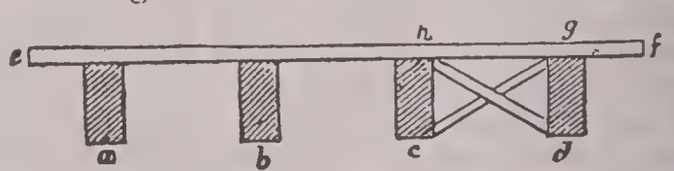
The printing is done by means of wood-blocks. The pattern is first drawn and painted, in its complete form and colors, upon a piece of paper; another piece of paper is laid under this, and the outlines of that portion of the pattern included in one color are pricked through to the lower paper. In like manner, pricked outlines of each of the others color are prepared. Each of these pricked sheets is laid upon a block of pear-tree wood, and dusted over with powdered charcoal or lampblack, and thus the pattern is drawn in dots upon the wood 'the carver cuts away the wood surrounding the pattern, and leaves it standing in relief. The pear-tree blocks are backed by gluing them to a piece of deal, and this piece again to another, with the fibres at right angles, to prevent warping. The colors are spread by boys upon padded cushions covered with floor-cloth, and each printer dabs his block upon that containing the required color, and then places it upon the floor-cloth, and striking it with the handle of a short heavy hammer, prints his portion of the pattern. He proceeds with a repetition of this, and as he advances, he is followed in order by the printers of the other colors, who place their blocks accurately over the pattern the first has commenced. The first printer's chief care is to keep the repetitions of the pattern accurately in line.—The quality of floor covering depends mainly on the number of coats of paint, the kind of medium used for the color, and the time given to drying. For the best qualities, a fortnight must elapse between the laying on of each coat; and finally, several months' exposure in the drying-room is necessary. As the rental of the space thus occupied, and the interest of the capital left stagnant during this time, amount to a considerable sum, there is a strong inducement to manufacturers to hasten the processes, which may easily be done by using gold size or boiled linseed oil, or other rapid 'dryers,' instead of raw linseed oil; but in proportion as the drying is hastened by these means, the durability and flexibility of the floor covering are decreased. To secure the maximum of durability, floor covering should still be kept three or four years after it has left the drying-room of the manu-

facturer, and purchasers should always select those pieces which they have reason to believe have been longest in stock. Narrow floor covering for stair-carpeting, passages, etc., is made as above, and then cut into the required widths, and printed. It usually has a large pattern in the middle, and a border of a smaller design.

The laying of lobbies and passages with encaustic tiles has led to the superseding of floor covering in such situations, while for some other purposes, such as covering the floors of churches, reading-rooms, and waiting-rooms at railway-stations, it is superseded by the material called Kamptulicon (q.v.), or vulcanized india-rubber cloth, impervious to wet, soft and quiet to the tread, and warm to the feet. This material is made plain or figured to resemble painted floor-cloth. See also LINOLEUM.

FLOOR—FLOORING: horizontal partition between the stories of a building, the upper part of which forms the floor of the apartments above, and the lower portion the ceiling of those below. Floors are constructed variously according to their dimensions, and to the weight they have to sustain. *Single-joisted floors* are the simplest and cheapest, and are used for ordinary buildings, where the distance between the bearings does not exceed 20, or at most 24 ft.

The annexed figure represents a section of a single-joisted floor in the line of the flooring-boards, and across the joists. These joists are beams laid edge upward resting at their ends upon wall-plates built into the walls. Their width should not be less than two inches, for if narrower, they would be liable to split with the nailing of the flooring-boards. They are placed edge upward to economize timber, as the strength of a beam to bear a transverse strain



a, *b*, *c*, *d*, the joists; *e*, *f*, the flooring-boards; *cg* and *dh*, herring-bone strutting.

varies simply with the breadth and with the square of the depth (see STRENGTH OF MATERIALS). When a deep and long joist is used, there is danger of its twisting or turning over; this is prevented by *strutting*, that is, nailing cross pieces of wood between them, as shown between the joists *c* and *d* of the figure, or less effectually, by driving pieces of planking between them. Strutting is required when the length of the joists exceeds eight ft. The laths for the ceiling of the room below are nailed to the bottom of the joists. In good substantial work, the distance between the joists from centre to centre is about 12 inches, but this is often exceeded in cheaply built houses. *Double-joisted floors* are constructed by laying strong timbers, called *binding-joists*, from wall to wall, about six ft. apart; and a double set of joists, one above for the floor, and one below for the ceiling, are laid across these, and notched down upon them.

These latter, when thus placed, are called *bridging-joists*, as they bridge over the interval between the larger binding-joists. This is adopted when a more perfect ceiling, free from cracks, produced by the yielding of the floor is required, or where there is a difficulty in obtaining a sufficient amount of long timber for single joisting the whole of the floor.—*The framed floor* is one degree more complex than the double-joisted. Binding and bridging joists are used in the framed floor but the binding-joists cease to be the primary support, as for this purpose strong balks of timbers called *girders*, are used. They are laid across, at distances of from eight to ten ft., and the binding-joists are framed into them by a *tusk-tenon* joint (see CARPENTRY). The bridging-joists are notched to these in the same manner as for double-joisted floors. A *bay* is the general name for the space between girders: if between a girder and wall, it is called a *tail bay;* or between two girders, a *case bay;* and the work between is described as a *bay of joisting*. When the space to be spanned is too great for a simple wood-girder, trussed or built-up wooden girders or iron girders are used: the latter have of late come into extensive use even where simple wood-girders are applicable (see GIRDER) With a given quantity of timber, and a moderate space, the single-joisted floor is the strongest of any. One of its disadvantages is the free communication of sound to the apartment below, unless some additional means of obstructing the sound be adopted.

When first laid, the floor should be rather high in the centre, to allow for settling at the joints: and when settled, it should be perfectly level, for if it rises in the middle, it will exert an outward thrust upon the walls, and if hollow, it will pull inward; but if level, its whole strain is perpendicular. The flooring-boards are usually nailed to the joists, and vary from 1 to 1½ inch in thickness; for common floors they are from 7 to 9 inches wide, but for better floors a width of only 3 to 5 inches is used. The advantage of the narrow boards is, that the shrinkage and warping have not so much effect on the spaces between. The facing of the floor in many old mansions is formed of small pieces of oak carefully inlaid: see PARQUETRY. For other kinds of inlaid fancy floors, see MOSAIC; ENCAUSTIC TILES; CONCRETE. In France, and most of the southern continental countries, where carpets are rarely used, the flooring-boards of the better class of houses are of hard wood, carefully and closely jointed, and these floors are commonly rubbed with bees-wax, and polished. In humbler dwellings, even the bedrooms are paved with tiles, or strong plaster, or concrete and considering the prevalence of fleas, etc., in such places, they are certainly better adapted for them than deal-boards and carpets. They may be freely sprinkled and even dashed with water in hot weather.—For warehouses where heavy goods are stored, for ball-rooms, etc., special construction is required to adapt the floor to the strain put upon it.

FLOP, v. *flŏp* [another spelling of FLAP, which see]: to hang loose; to bob; to bounce. FLOP′PING, imp. FLOPPED, pp. *flŏpt*.

FLOQUET, *flo-kā′* CHARLES THOMAS: statesman: b. St. Jean-de-Luz, France, 1828, Oct. 5; d. 1896, Jan. 18. He was educated in the College of Louis-le-Grand, Paris; was admitted to the bar 1851; practiced law for many years; was elected deputy mayor of Paris and member of the national assembly for the dept. of the Seine on the fall of the empire; and was interned at Pau for several months, 1871, for suspected sympathy with the Commune. In 1872 and 74 he was elected to the municipal council, and 1875 was its pres.; 1876 was chosen to the chamber of deputies; 1881 was elected vice-pres. of the chamber; and 1882 was for a short time prefect of the Seine, and was re-elected vice-pres., and elected pres. of the chamber. On the retirement of President Grévy, Floquet was nominated as a candidate for president of the republic. In 1888, April, he was called to form a new cabinet, in which he took the offices of president of the council and minister of the interior. In July following, he was so far provoked by Gen. Boulanger as to challenge him to a duel, in which he seriously wounded the general with a rapier. 1889, Feb. 14, his ministry was forced to resign by an adverse vote on his revision bill; but Nov. 17 he was re-elected president of the chamber for the session 1889–90.

FLORA, n. *flō′ră* [L. *Flōră*, the goddess of flowers—from *flos*, or *flōrem*, a flower]: in *bot.*, collective name of all the plants peculiar to a country, an area, or to a geological era, as *fauna* denotes all the animals; a work relating to the botany of a region is often termed the Flora of that region. FLO′RAL, a. *-răl*, pertaining to flowers; in *bot.*, seated about the flower-stalk, and near the flower. FLORÉAL, *flō-rā-al* (flowering), 8th month in the calendar of the French Republic, April 20–May 19; it was established 1793, October, and the Republican year dated from 1792, Sep. 22. FLORES′CENCE, n. *-rĕs′ĕns*, the flowering of plants. FLORET, n. *flō′rĕt*, a little flower (see FLOWER). FLORID, a. *flŏr′ĭd* [L. *florĭdus*, flowery]: bright in color; showy; brilliant. FLOR′IDLY, ad. *-lĭ*. FLOR′IDNESS, n. brightness or freshness of color. FLORID′ITY, n. *-ĭ-tĭ*, florid character. FLORIFEROUS, a. *flō-rĭf′ėr-ŭs* [L. *fĕro*, I bear]: producing flowers. FLORIFORM, a. *flŏr′ĭ-fawrm* [L. *forma*, shape]: flower-shaped. FLOR′IST, n. *-ĭst*, a cultivator of flowers. FLOR′ICUL′TURE, n. *-ĭ-kŭl′tūr* [L. *cultūră*, cultivation]: whatever relates to the culture and arrangement of plants grown for their flowers, or as subjects of taste. FLOR′-ICUL′TURAL, a. *-tū-răl*, pertaining to. FLORAL DIAGRAM, representation of the cross-section of a flower. FLORAL ENVELOPES, in *bot.*, parts which envelop or surround the stamens and pistils for the protection of the reproductive organs. They consist of calix and corolla, sometimes with an involucre or bracts external or outside of these. Some plants are without one or both floral envelopes.

FLO'RA: among ancient Romans, the goddess of flowers and of the spring; later identified with the Greek *Chloris*. Her temple was in the vicinity of the *Circus Maximus*. The worship of Flora was one of the oldest manifestations of the Roman religious feeling, and is affirmed to have been introduced by Numa. The *Floralia*, or festivals in honor of the goddess, were first instituted B.C. 238 and were celebrated Apr. 28—May 1, with much licentious merriment, prostitutes playing an important part on such occasions. On coins, Flora is represented with a crown of flowers.

FLORAMOUR, n. *flōr-a-môr* [F. *flor*, flower; *amour*, love]: flower begetting love; name formerly applied to different cultivated species of Amaranthus.

FLORAN, n. *flōr'an* [etym. doubtful]: fine-grained tin; either scarcely perceptible in the stone or stamped very small.

FLORASCOPE, n. *flōr'a-skōp* [L. *flos*, a flower; Gr. *skopeo*, I view, I examine]: microscope designed for examining flowers.

FLORENCE, *flŏr'ens:* province of Italy, in Tuscany; bordering on Modena, Bologna, Ravenna, Urbino, Arezzo, Siena, Pisa, and Lucca; 2,263 sq. m. It is divided into four districts, Florence, Pistoja, Rocca San Casciano, and San Miniato, traversed on the e. by the main chain of the Central Apennines, and drained by the Arno river and its numerous affluents. Between the Apennines and the isolated mountains in the e. and s. are extremely fruitful valleys, where wheat, the choicest Tuscan wine, and silk are produced. Cap. Florence. Pop. of prov. (1901) 939,054.

FLORENCE: city, capital of Lauderdale co., n.w. Ala.; on Tennessee river, at the head of steamboat navigation, and on the Louisville and Nashville and the Southern railroads. Florence produces coal, iron, and marble; has iron furnaces, cotton and saw mills, and cotton-seed oil, fertilizer, and wagon factories. The Southern University for Women, State Normal School, and Synodical Female Coll. are here. Pop. (1910) 6,689.

FLORENCE (Ital. FIRENZE): city of Italy, cap. of the former duchy of Tuscany; in the valley of the Arno; lat. 43° 46′ n., and long. 11° 15′ e. It is about 123 ft. above the level of the sea; 60 m. from Leghorn, 40 from Siena. Communal pop. (official, 1901, Feb. 10) 205,589. The Arno, spanned by four fine bridges, divides the city into two unequal parts, the chief of which is on the n. bank. In shape, an irregular pentagon, Florence is inclosed by walls about 6 m. in extent, and communicates with the exterior by eight gates, which conduct to thickly peopled suburbs, and a lovely, fertile, and salubrious neighborhood, encircled by sloping hills, and studded with picturesque villas, vineyards, and gardens. Many causes render Florence most attractive to foreigners—a lovely

country and healthful climate, cheap living, and the universal courteous intelligence of the people, united to the immense interest of grand historical monuments and collections of art. The massive and austere forms of Florentine architecture impart an air of gloomy grandeur to the streets, for the most part regular and well kept. The chief monument of the city is Il Duomo, or the Cathedral, the foundations of which were laid with great solemnity 1298. The Florentines, having ambitiously resolved on erecting a monument which for architectural splendor and proportions should outvie all preceding structures, the honor of preparing the design was intrusted to Arnolfo de Cambio da Colle. On his death, Giotto superintended the works; and many eminent architects were employed before this splendid edifice was completed—Brunelleschi, the last, conceived and erected the grand cupola, so much admired by Michael Angelo as to have served him as model for that of St. Peter's. At the side of the cathedral springs up the light and elegant bell-tower, detached, according to the custom of the times. In front is the Baptistery of San Giovanni, in form an octagon, supporting a cupola and lantern; all three edifices being entirely coated with a varied mosaic of black and white marble. Three bronze gates in bassorilievo are a great additional adornment of the Baptistery; the two by Ghiberti have been immortalized by Michael Angelo with the name of Gates of Paradise: see Sgrilli's description. The church of the Santa Croce, the Pantheon of Florence (built 1294—architect, Arnolfo), contains monuments to Galieo, Dante, Macchiavelli, Michael Angelo, Alfieri, etc. The church of San Lorenzo was consecrated as early as 393 by St. Ambrose, and rebuilt by Brunelleschi 1425, by command of Giovanni and Cosmo de' Medici. It contains an interesting monumental memorial of Cosmo il Vecchio, bearing inscribed the title *Pater Patriæ*, which had been conferred on his memory by public suffrage the year following his death. In the *Nuova Sagrestia*, or New Sacristry, are the two famous monuments of Michael Angelo to Julian and Lorenzo de' Medici. The figure of these two statues are marvels of deep and living expression, and unsurpassable in their mute and eloquent beauty. The Medicean chapel, gorgeous with the rarest marbles and most costly stones, agate, lapis lazuli, chalcedony, etc., stands behind the choir, and contains the tombs of the Medici family, and those of the grand dukes, their successors. Annexed to the church is the Laurentian Library, with its inexhaustible store of rare MSS., founded by Giulio de' Medici. Bandina has published the catalogue of the Greek, Latin, and Italian MSS.; and Biscioni and Assemani those of the Hebrew and Oriental. Among the numerous palaces, *Il Bargello*, now converted into a prison, is one of the most ancient, and was formerly the abode of the republican magistrate, the Podestà. In 1841, some interesting portraits were brought to light by the removal of a coating of whitewash from the

PANORAMA OF FLORENCE, ITALY.

revered features of Dante, Brunetto, Latini, Corso Donati, etc., in the chapel of the palace. The Palazzo Vecchio, seat of the republican government from its establishment till 1530, when it was abolished, is an imposing mass of building, surmounted by a lofty tower 260 ft. high, the great bell of which used to warn the citizens of danger, or summon them to defense. Adjoining the palace is the Piazza del Palazzo Vecchio, a square containing a fine collection of statues, and a noble arcade, the Loggia de' Lanzi, under the porticoes of which are magnificent groups of sculpture (see Rastelli's *Illustrazione Storica del Palazzo della Signoria detto Palazzo Vecchio*); Gli Uffizi, a handsome building between the Palazzo Vecchio and the Arno, founded by Cosmo I., in the first floor of which are deposited the archives of the court of justice and other public offices, also the Magliabechi Library of 150,000 vols. and 12,000 MSS. On the second floor, in a circular suite of 23 rooms, is contained the famous Florentine gallery of art; rich in paintings, engravings, sculpture, bronzes, coins, gems, and mosaics. A splendid apartment, known as the Tribuna, contains the rarest treasures of the collection, and is in itself a wonder of art, with its cupola inlaid with mother of pearl, and its rich marble pavement. The Palazzo Pitti, the modern grand ducal residence, has a superb gallery of paintings, and a collection of 70,000 rare vols. and 1,500 MSS.

The Palazzo Riccardi, now public property, is much frequented for its fine library. The Palazzo Strozzi is a fine type of Tuscan architecture. Florence abounds in other noticeable public edifices and monuments. The practical and philanthropical institutions also are numerous and excellently organized. The hospital of Santa Maria Nuova contains a college of medicine and surgery which has a European fame. The Academy of Fine Arts and the Museum of Nat. History afford unlimited resources to the public interested in their collections. There are three hospitals, one lunatic asylum, nine theatres. The Academy della Crusca is intrusted with the care of sifting and preserving uncorrupted the Italian language. The Academy dei Georgofili was established in the interests of agriculture. Florence is the see of an abp., the seat of a prefecture, and of numerous provincial courts, as well as the military headquarters of the region. Its railway communications are ample. The chief industrial occupations of the Florentines are the fabrication of silk and woolen textures, and of straw-plaiting for hats, etc., jewelry, and exquisite mosaics in rare stones. Education is more diffused in Tuscany than in other Italian state; and the Florentines are famous for their caustic wit and natural gifts of eloquence, as well of for their shrewd thriftiness and unflagging labor. In their moral superiority to other states may be recognized the effects of a better and more upright government than those which existed in most parts of the peninsula previous to the recent union of Italy.

History.—The city of Florence sprang originally from

Fiesole (q.v.), at the foot of which it lies extended. The inconvenient and hilly site of the Etruscan Fiesole, perched on the crest of an irregular height, rendered the town so difficult of access to the traders who resorted to its market-places with their various merchandise, that it was at length decreed that they should assemble at the base of the hill, in the fertile plain traversed by the Arno. The few rough shelters erected for the accommodation of these traders may be considered the original nucleus of the important and splendid city of Florence. Such at least is the traditionary history of its origin generally accepted by the Florentine historians. It seems that as early as the time of Sulla there had been a Roman colony here; another was sent after the death of Julius Cæsar, and it soon became a thriving town. The *Florentini* are mentioned by Tacitus, A.D. 16, as sending delegates to Rome, but it was not till the time of Charlemagne that Florence began to rise out of obscurity. It was then governed by a political head with the title of duke, assisted by various subordinate officers, elected by the united suffrages of the duke and citizens. In the 11th c., Florence and a great part of Tuscany, were bequeathed to Pope Gregory VII., by his friend and partisan the Countess Matilda, who inherited from her mother, the Countess Beatrix, her jurisdiction over the city. Under the protection of Rome, Florence speedily adopted the forms and institutions of a free city; and the republican spirit which then arose among the people imparted an impulse to national and individual life, and awoke a spirit of ardent patriotism and splendid enterprise. As early as the 11th c. the Florentines were European traders, and the possessors of grand commercial dépôts in the seaports and cities of France and England, and their skill as workers in gold and jewels had grown proverbial. In proportion as papal preponderance increased in Florence, that of the empire sank; and in 1113 the citizen forces routed the troops, and slew the delegate of the emperor at Monte Cascioli, near Florence. During the bitter wars between pope and empire, Florence and all Tuscany seemed to have been saved from the civil feuds which raged throughout Italy between the contending factions of Guelphs and Ghibellines; the former adherents of the pope; the latter, of the empire. But in 1215, Florence became involved in the great party struggle, owing to a private feud breaking out between two noble families, chiefs of the contending principles. A Guelph noble, Buondelmonti, mortally incensed the Ghibelline family of the Amidei, by breaking off his alliance with a daughter of their house, and contracting marriage with a member of a Guelph family. To avenge this insult, the Amidei appealed to their powerful kinsman, the Uberti, and, in fact, to all the Ghibelline party of Florence. Buondelmonti was stabbed to death as he crossed the bridge of the Ponte Vecchio, and was speedily avenged by the Guelphs in the blood of his enemies. Thus for 33 years was Florence distracted by the deeds of bloodshed and violence of these two rival factions, who assumed

THE CATHEDRAL OF FLORENCE.

the names, and adopted the respective causes of Guelph and Ghibelline: (see GUELPH AND GHIBELLINE). In 1250, the animosity of these parties seemed somewhat blunted, and public attention was directed to wise internal reforms. Twelve magistrates, or anziani, were appointed in place of the consuls, each of the six sections into which the city was divided being intrusted to two of these magistrates, whose tenure of office was annual. To avoid all local dissensions, two other magistrates, strangers by birth, were elected: one, invested with supreme authority in civil and criminal cases, was called the podestà; the other, with the title of captain of the people, had the chief command of the militia, in which were enrolled all the youth of the state, who were bound, at the call of this magistrate, to join their company fully equipped for fight: 20 companies defended the town, 96 the country. After the death of Emperor Frederick II., the great protector of the Ghibellines, the Guelph or papal party gradually rose in power in Florence, and during ten years of their predominance, the city ascended in grandeur and prosperity, until it stood not only the first in Tuscany, but one of the first of all Italy. In 1254, the Florentines first coined their noble golden florin, unequalled at the time for beauty: in weight, a drachm, it bore on one side the national emblem, a lily; and on the reverse, the effigy of the popular patron, St. John the Baptist. It commemorated a period of great success in the annals of Florence, whose forces had successively humbled the adjoining towns of Siena, Arezzo, Pisa, and Pistoja 1252, and 1254 captured volterra. In 1260, the standard of civil war was again raised by the Ghibellines of Florence, who, in league with Manfred of Naples, attacked the Guelphs, and cut their forces to pieces in the sanguinary battle of Monte Aperto. The conquerors entered Florence forthwith in the name of Manfred, abolished all trace of the popular institutions, establishing an exclusively aristocratic executive, and even strongly advocated the entire destruction of the city, the hotbed of Guelphism. This barbarous scheme was indignantly repudiated by their own famous leader, Farinata degli Uberti, immortalized by Dante for his patriotism. He declared his intention of heading the Guelphs, were such a sacrilege perpetrated by his own party. Pope Urban IV., French by birth, summoned against the Ghibelline Manfred a French army, led by Charles of Valois, to whom he offered the prospective kingdom of the Two Sicilies. Manfred was defeated and slain in the famous battle of Benevento, and Guelph ascendency was restored anew throughout Italy and Florence. Charles fully restored to the Florentines their internal institutions, and received their offered allegiance for ten years, 1266. In 1282, the *Priori* a new executive power, was established in Florence; and in 1293, by the consent of the Priori a higher chief than their own order was elected, with the title of *Gonfaloniere*. In 1300, Dante became one of the Priori, and the former feud was recommenced with new vigor between two factions, who bore

the names of Bianchi (Whites) and Neri (Blacks). Their dissensions were, however, interrupted by the appearance of Charles of Valois, sent by Boniface VIII. to restore tranquillity, 1301. Charles espoused the part of the Guelphs or Neri, and sanctioned every outrage on the Bianchi, who were plundered and murdered barbarously, the survivors being exiled and beggared; among these were Dante, and Petracco dell' Ancisa, father of Petrarca. In 1306, Pistoja was besieged, and taken by famine with great barbarity. In 1315, the Florentines met with a severe check from the Ghibellines of Pisa, under the command of Uguccione della Faggiula; and in 1325, were completely defeated by Uguccione's successor in command, the valiant Castruccio Castracani, in the battle of Altopascio. Florence, weakened by long dissensions, and alarmed by Castruccio's threat of marching on the city, appealed to the king of Naples for aid. They received joyfully an officer of the king, entitled the Duke of Athens, sent as royal vicar; and such was the public demoralization of the moment, they proclaimed him dictator of the republic, unanimously suppressing the offices of priori and gonfaloniere. The intrigues of this ignoble schemer to overturn the republic being discovered, he was ignominiously expelled by a general popular rising, and narrowly preserved his life. An attempt to admit a proportion of the nobles into the government signally failed at this time, and only led to renewed animosity between them and the citizens. This was the last effort of the nobles to secure power. See Macchiavelli, Book II. A terrible pest decimated Florence 1348, sweeping off 100,000 of her inhabitants: see Boccaccio, *Decameron*. The chief power of Florence about this time seems to have been alternately wielded by the democratic families, the Alberti and the Ricci, and by their patrician rivals, the Albizzi, who, for 53 years, guided the republic in the path of independence and progress. In 1406, the ancient and illustrious republic of Pisa (q.v.) fell under the sway of Florence, after a most heroic resistance. From 1434, the history of Florence is intimately bound up with the House of Medici, whose influence supplanted that of the Albizzi: see MEDICI. The Medici were repeatedly banished from Florence in consequence of their aiming at sovereign power; and to their intrigues Florence owes her final loss of republican rights and institutions. Pope Clement VII., of the House of Medici, formed a league with Emperor Charles V., by which the liberties of Florence were to be extinguished, and the sovereign power to be invested in the pope's bastard son, Alexander de' Medici. In 1529, Sep., an army of imperialists, under the Duke of Orange, entered Tuscany; and 1530, Aug. 8, the siege of Florence terminated, after a defense of unexampled devotion and bravery on the part of the citizens. Thus fell the name and form of the republic of Florence, quenched in the best blood of the city, a sacrifice to a renegade pope, who employed both foreign robbers and internal traitors to destroy and humiliate the city of his birth. From this

PONTI VECCHIO, FLORENCE.

period, Florence loses her distinctive history, and is known only as capital of the grand duchy of Tuscany, Pope Clement having conferred on Cosmo de' Medici the ducal dignity. Some idea of the splendor and prosperity of Florence as a republic may be had from the fact, that her capitalists were so enormously wealthy, that they supplied the chief sovereigns of Europe with funds; her manufactures of wool, silk, and gold brocade were exported throughout the world; and besides home centres of commerce, she possessed great commercial establishments in all the countries of Europe. This wonderful prosperity the Florentines owed solely to their indomitable spirit of enterprise. Florence was until 1871 the cap. of the new kingdom of Italy; since that year the capital is Rome. See Perrens, *Histoire de Florence* (5 vols. 1877-80).

FLORENCE, Council of: continuation of the council of Bâle, opened 1431, Dec. 14, transferred to Ferrara 1438, Jan. 8, and removed to Florence 1439, Jan. It was the 17th œcumenical council recognized by the Rom. Cath. Church, and was virtually closed 1442. It was originally called by Eugenius IV. for the purpose of reuniting the Eastern and Western Churches, and for some time the pope maintained an attitude of hostility to the reformatory measures proposed; but through a compromise effected 1434, he took the direction of the council into his own hands. After the removal of the council to Florence, the eastern prelates increased greatly in numbers, and the Greek emperor, John Palæologus, anxious to gain the assistance of the West in his struggle with the Turks, personally urged the bps. to come to an understanding on the points that still kept the two churches apart. These were (1) the addition of *filioque* to the Nicene Creed; (2) the use of unleavened bread in the Eucharist; (3) purgatory; (4) papal supremacy. In 1439, June 8, the first was agreed to; a month later, the other three were settled by compromise; and, on July 6, Cardinal Cesarini proclaimed the agreement in the presence of the pope and the Greek emperor and his bishops. In 1443, the partiarchs of Alexandria, Antioch, and Jerusalem united in a formal denunciation of the council and its act of reconciliation. A portion of the original council continued to sit in Bâle till 1448, then removed to Lausanne, and was closed 1449, Apr. 25. It elected an antipope, Felix V. 1440, who resigned 1449.

FLORENCE OF WORCESTER, *flŏr'ėns ov wûs'ter:* lived in the latter part of the 11th c.; d. 1118. He was a monk at Worcester, and compiled a *Chronicle,* which begins with the creation of the world and comes down to the year of his death. For the history of his own time, his work has high value.

FLORENCE-FLASK: flask of thin glass with a large globular body and long narrow neck, in which Florence-oil is exported from Italy.

FLORENCE-OIL: superior kind of olive-oil prepared at Florence.

FLORENTINE, a. *flŏr'ĕn-tĭn:* of or from Florence, in Italy: N. a native of. FLORENTINE-EXPERIMENT, an experiment made in 1661 by some academicians at Florence to test whether water was compressible or not. They inclosed it in a globe of thin gold, hermetically sealed. In compressing the globe the water, instead of yielding, forced itself through the pores of the gold and stood in drops on its outer surface. FLORENTINE-FRESCO, kind of painting for decorating walls, first practiced at Florence during the flourishing period of Italian art. FLORENTINE-LAKE, pigment prepared from cochineal. It is not now in use, having given place to the more durable lake prepared from madder. FLORENTINE-MOSAIC, name given to the art of inlaying tables and other plane surfaces with *pietra dura* (q.v.) and *pietra commerse,* carried on principally at Florence. FLORENTINE-RECEIVER, form of receiver for the results of the distillation of essential oils. FLORENTINE-SCHOOL, in *painting,* school of art remarkable for attitudes seemingly in motion; for dark severity; for an expression of strength by which grace is perhaps excluded; and for a character of design approaching the gigantic. FLORENTINE-WORK: same as FLORENTINE-MOSAIC.

FLORES, *flō'rĕs:* island in the Malayan Archipelago, about half way between Java and the e. extremity of the chain; due s. from Celebes; 8°—9° s. lat., and 120°—123° e. long. Like most members of the group, it is ob-

long, 200 m. in length by an average breadth of 35, and is hilly and of volcanic origin. It produces cotton, sandal-wood, and bees-wax; and its principal trade is with Singapore.

FLORES: most westerly island of the Azores; lat. 39° 25′ n., and long. 31° 12′ w. Pop. abt. 10,000.

FLORES: island in the Pacific, a little to the w. of Vancouver Island; lat. 49° 20′ n., and long. 126° west.

FLORES: island in the river Plata, about 20 m. below Monte Video, in the republic of Uruguay; lat. 34° 56′ s., and long. 55° 55′ west.

FLORIAN, *flō′rĭ-an*, SAINT: abt. 190-230; b. Zeiselmauer, Austria: patron saint of Poland. He was of Christian parentage; became a capt. in the Roman army, and, because of his uncompromising Christianity during the persecutions by the Emperor Diocletian, was drowned in the river Enns, near Larch, in Austria. His remains were buried on the site of the present magnificent Augustinian abbey of St. Florian, near Enns. His bones were subsequently removed to Rome, where they remained undisturbed till 1183, when a portion or all was presented to King Casimir of Poland, who had them reverently preserved at Cracow. Florian has since been venerated as the patron saint of Poland, his day being Aug. 4.

FLORICULTURE: propagation and management of flowering plants. In a rude way floriculture has been pursued by many tribes and peoples which had made little progress in the arts. As civilization advances, flowers are more extensively cultivated and their quality is greatly improved. In many countries floriculture has become a prominent industrial pursuit. Accurate statistics cannot be obtained, but it is known that the flower trade of a few of the leading cities in this country, reaches many millions of dollars every year while that of London is said to average $25,000 per day. It is probable that closer, though by no means so general, attention is given to flowers than is bestowed on the most valuable grains, the choicest fruits, or the most useful vegetables. A single plant of a new and promising flower frequently sells for several thousand dollars. In various European and Asiatic countries vast quantities of flowers are grown for the manufacture of various perfumes. Roses, violets, and heliotropes are among the varieties most extensively cultivated for this purpose. Certain kinds of flowers, as the Camomile, are used for medicinal purposes. The Chinese have long been noted for their skill in floriculture, and the people of India and Japan also are quite proficient therein.

For its beneficent influence on the taste and character, as well as for the pleasure which it confers, the pursuit of floriculture in connection with the ordinary business of life is to be commended. While many exotics require a degree of care and protection from adverse influences which only those who have conservatories (see CONSERVATORY)

can bestow, there are a large number of hardy varieties, both beautiful and fragrant, which the owner of the smallest garden can cultivate easily and successfully. Plants can be obtained from seed or, for a small sum, may be purchased from a florist. The land should be rich and free from stagnant water. It should be deeply dug, finely pulverized, and liberally enriched with well rotted manure or, what is much better, a suitable commercial fertilizer. If seeds are used, the sowing should not be done until the ground is dry and warm. Only a shallow covering of earth is required, but it must be firmly packed upon the seeds. If plants are purchased they should not be put out too early in the spring. Weeds must never be allowed to grow in the flower bed, and if drought prevails water should be carefully given at night. It should be applied when the surface becomes dry and before the plants begin to wilt. Enough should be given at a time to thoroughly moisten the earth around the roots, but none should stand upon the surface. When the blossoms are fully formed they should be removed, as the plant will be weakened and the production of flowers checked by allowing seed to form. Many fine and popular varieties of flowers may be made to bloom in open ground in summer, also in the house during the winter. They should be planted out in spring, in six or seven inch pots, the holes in the bottom having been previously closed. In the autumn they can be removed without injury to the roots. A large number of half-hardy flowers can be readily grown without artificial heat by giving a little extra care and occasional protection, while tender plants can be grown in a green-house (q.v.) at moderate cost. Many varieties of flowers can be grown with fine effect on balconies and verandas. In these locations creeping plants and vines to hang over the railings, and vigorous plants with upright forms, showy foliage and bright flowers, make a fine appearance. Window gardening (q.v.) also furnishes a comparatively easy method of growing many choice varieties of flowers, while ferns and other plants requiring a moist atmosphere are successfully grown in Wardian Cases (q.v.).

Various methods of arranging flowering plants in ornamental grounds are adopted. Of these the 'carpet style' is now the most popular for extensive ornamentation. Plants are selected which grow only a few inches high, and of various colors. They are set so closely as to cover the ground, and the different parts of the bed are separated by strips of turf which contrast clearly and beautifully with the color of the flower. As an immense number of plants are required and much labor and skill needed in the arrangement, this is a very costly style of landscape decoration. Four beds at Long Branch, N. J., a few years ago, in the private grounds of a New York gentleman were said to contain a million and a half of plants, and were so finely arranged that they presented a scene of marvelous beauty. Ribbon planting, giving lines of color by the side of roads or walks and planting in masses, a large number of plants

of the same color being used together, are much cheaper methods as the plants cost less and, on account of their greater vigor, can be set farther apart, while the work of planting and caring for them is greatly diminished. The system of massing flowers was introduced about 50 years ago. The individuality of the plant is lost, but if properly arranged, the mass of color makes a beautiful display.

Propagation of flowers is effected by seeds, bulbs, cuttings from the wood or roots, layers, or divisions of the roots, according to the character and habits of growth of the variety to be multiplied. As cuttings, or slips, from the unripe growth of most plants can be readily made to grow, their use is a favorite method of propagation. As a rule when the stem will break if an attempt to bend it is made, it is in the best condition to use, but woody plants, as roses, should be more mature. Slips should be started in sand that is kept constantly soaked with water. A saucer holding sand an inch or two in depth may be used. It should be kept in a warm room and in the sunlight as much as possible. As soon as roots are formed, usually in from one to three weeks, the cuttings should be placed in small pots filled with fine, rich soil. As size increases they may be transferred to larger pots. Cuttings will root more readily in spring than in mid-summer. New varieties are secured by accidental variations, by hybridization (see HYBRID) and from seedlings. Improvement is effected by the selection and careful cultivation of the finest specimens through a series of years. Wonderful changes in appearance have thus been effected; some of the finest double flowers with brilliant hues having been obtained from varieties which in the wild state had but few petals and dull colors.

Floriculture as a commercial enterprise in the United States has chiefly developed within the last fifty years. It is mostly confined to the growing of flowers and plants in greenhouses. The total output of florists' establishments in the United States, at wholesale rates, was reported in 1900 as $18,422,522. Owing to the increase of population of the eastern cities, and consequent increase of wealth and luxury, a demand for flowers began to be felt in the second quarter of the last century; and thus began the development of commercial floriculture in this country. This branch of horticulture first became prominent in the vicinity of Philadelphia and Boston. In the early days more wealth was centered in these cities, and the people there paid more attention to luxuries in home surroundings. New York was less prominent in the development of this industry. From 1830 to 1840 floriculture made considerable progress, owing to improved methods in the construction and management of greenhouses, as well as to the increased demand for flowers. The application of hot-water heat to greenhouses gave an impetus to the work, making it possible to grow better plants than had been previously grown. See FRUIT: *Commercial Fruit Growing.*

FLORIDA, *flŏr'ĭ-da*, Sp. *flo-rē'thâ:* a state, one of the U. S. of America, 14th in order of admission into the Union, 12th in area, 33rd in pop. (1910), 1st in orange production, 3rd in sugar and molasses, 6th in rice, 10th in cotton; popularly known as the 'peninsular state.'

Location and Area.—This most south. of the states is between lat. 24° 30′ and 31° n., long. 79° 48′ and 87° 38′ w.; bounded n. by Ga. and Ala., e. by the Atlantic Ocean, s. by the Gulf of Mexico and Strait of F., w. by the Gulf and Perdido river; length of peninsula 375 m., width average 90 m.; 58,680 sq. m. (37,555,200 acres); water-surface, permanent, 2,841,600 acres, occasional, over 9,000,000 acres. F. is divided into 45 counties.

Topography.—F. has a longer coast-line than any other state—472 m. on the Atlantic, 674 m. on the gulf—but owing to its numerous keys, coral reefs, and shallow soundings, has few good harbors, the best being St. Augustine and Fernandina on the Atlantic; Pensacola, Appalachicola, St. Marks, Cedar Keys, Tampa, Charlotte, and Key West on the gulf; and Jacksonville on St. John's river. The greatest elevation of the state does not exceed 200 ft. above sea level, and there are many depressions known as sinks, varying in size from a few yards to several acres. In the s. half are many lakes, swamps and marshes. The principal of the former are Okeechobee, a shallow body, area 650 sq. m.; Ahapopka; Istokpoga; Orange, Kissimee; Cypress; Lake George; Lamone; Washington; Tohopokaliga; Alligator; Dunn's; Harris; Griffin; Trati-Apopka; Jessup; Monroe; Santa Fé. and Maitland. The swamps include the Everglades, the outlet of Lake Okeechobee, 90 m. long, 30-50 m. wide, area 3,000 sq. m., which in wet weather are almost wholly submerged; the Kissimee and Cypress, n. of Lake Okeechobee; and the Okefinchee. of which two-thirds are in Ga. The chief rivers are the St. John's, remarkable for its beautiful tropical scenery; Ocklawaha; Appalachicola; and St. Marys—all navigable by steamboats. The extreme s. portion of F. terminates in a bow-shaped chain of keys covered with hard, rocky knolls and low sand-pits of sand, coral, and shells. See F. Keys: Dry Tortugas.

Natural Resources.—F. is of tertiary and post-tertiary origin, based mainly on coral beds. Its chief mineral products are *coquina*, a conglomerate of broken shells, which affords a substantial building material; shell and coral limestone; pottery and brick clay; limonite iron ore, found in the largest quantity in Jackson co.; rich deposits of phosphates in Wakulla, Alachua, Marion, Hillsborough, and Manatee counties (the best in Wakulla); and lignite coal, recently discovered in Santa Rosa co., near Black water river. The best clay is in Escambia co.

Climate.—The climate is delightfully equable. Intense cold is never known, and frost is rarely seen below Orange Lake. The range of the thermometer in the n. is from 90° to 26° F., in the centre and s. from 90° to 43° F., and summer heat is tempered by the ocean and gulf. Rainfalls are copious, and variable, averaging 50 inches on the Atlan-

Area in Square Miles, 58,680. Population, 528,543.
Number of Counties, 46. Capital of State, Tallahassee.
ATLANTIC OCEAN
GULF OF MEXICO
GEORGIA
ALABAMA
Okefinokee Swamp
Lake Okeechobee
Everglades
Big Cypress Swamp
THE GLADES
TALLAHASSEE
Jacksonville
St. Augustine
Palatka
Gainesville
Ocala
Lake City
Tampa
Fernandina
Pensacola
Key West
Miami
Apalachicola
Cedar Keys
Tarpon Springs
Clearwater Harbor
St. Petersburg
Sarasota
Bradentown
Fort Myers
Naples
Marco
Sanibel
Canaveral
Daytona
Port Orange
New Smyrna
Deland
Orlando
Winter Park
Kissimmee
Lake Kissimmee
Winterhaven
Bartow
Lakeland
Auburndale
Haines City
Plant City
Brooksville
Dade City
Zephyrhills
Wesley Chapel
Land O' Lakes
Trilby
Dunnellon
Inglis
Crystal River
Homosassa
Floral City
Inverness
Lecanto
Citrus Springs
Beverly Hills
Hernando
Brooksville
Spring Hill
Weeki Wachee
Hudson
Port Richey
New Port Richey
Holiday
Tarpon Springs
Palm Harbor
Dunedin
Clearwater
Largo
Seminole
Pinellas Park
St. Petersburg
Gulfport
Tierra Verde
Bradenton
Palmetto
Ellenton
Parrish
Myakka City
Sarasota
Venice
Nokomis
Osprey
Englewood
Grove City
Punta Gorda
Charlotte Harbor
Port Charlotte
Boca Grande
Pineland
Captiva
Estero
Bonita Springs
Everglades City
Chokoloskee
Copeland
Flamingo
Homestead
Florida City
Perrine
Cutler
Coconut Grove
Miami Beach
Miami
Hialeah
Opa-locka
Miami Springs
Medley
Doral
Kendall
Tamiami Trail
Alligator Alley
Krome Ave
Turnpike
Okeechobee
Clewiston
Moore Haven
Labelle
Immokalee
Ochopee
Carnestown
Everglades National Park
Ten Thousand Islands
Key Largo
Tavernier
Islamorada
Marathon
Big Pine Key
Sugarloaf Key
Key West
Dry Tortugas
Fort Jefferson
Marquesas Keys
Florida Keys
Florida Strait
Bay of Florida
Gulf of Mexico
Apalachicola Bay
St. Joseph Bay
Choctawhatchee Bay
Pensacola Bay
Escambia Bay
Blackwater Bay
Santa Rosa Sound
Perdido Bay
Escambia R.
Blackwater R.
Yellow R.
Choctawhatchee R.
Apalachicola R.
Chipola R.
Ochlockonee R.
Suwannee R.
Withlacoochee R.
Withlacoochee R.
Hillsborough R.
Peace R.
Caloosahatchie R.
St. Johns R.
Indian R.
Banana R.
Indian River
Inlet
Lake Istokpoga
Lake Jackson
Lake Miccosukee
Lake Iamonia
Lake Talquin
Lake Seminole
Lake Kissimmee
Lake Okeechobee
Lake Harney
Lake Monroe
Lake Jesup
Lake Apopka
Lake Dora
Lake Eustis
Lake Griffin
Lake Weir
Lake Orange
Lake Lochloosa
Lake Santa Fe
Lake Alto
Lake Newnans
Lake Wauburg
Lake Miccosukee
Lake Iamonia
Lake Talquin
Lake Seminole
Lake Kissimmee
Lake Okeechobee
Lake Harney
Lake Monroe
Lake Jesup
Lake Apopka
Lake Dora
Lake Eustis
Lake Griffin
Lake Weir
Lake Orange
Lake Lochloosa
Lake Santa Fe
Lake Alto
Lake Newnans
Lake Wauburg
WESTERN CONTINUATION OF FLORIDA
Same scale as large map
SCALE OF MILES
0 10 20 40 60 80 100
Longitude West 83° from Greenwich
BORMAY, N.Y.

tic coast and at Key West, 32 at the mouth of the Caloosahatchie river, and 75 on Appalachee Bay. The hygienic drawbacks of the state are malarial and intermittent fevers, and occasional visitations of yellow fever, that of 1888 at Jacksonville and the adjacent country being very severe and fatal. Through prompt measures by the national and various state govts., fever was prevented obtaining any considerable lodgment in contiguous states. Despite the danger of fevers, however, F. has become one of the most popular winter resorts of citizens of the n. states; and St. Augustine, Jacksonville, and Fernandina have some of the largest and best-appointed hotels in the world.

Zoology.—In animal life, F. is very prolific and interesting. Numerous species of birds, renowned for song and plumage, and not seen elsewhere, abound along the St. John's river and the lakes. Deer, small black bear, raccoon, opossum, manatee or sea-cow, wild turkey, alligator, crocodile (in the s.), water-fowl, cougar, panther, gray and black wolf, fox, cotton-tail deer, fish-otter, and shad, black and other bass, sheepshead, mullet, grouper, turtle, and shark are found by hunter and fisherman in accessible localities.

Agriculture.—The great timber products of the State include long-leaved pine, live oak, red cedar, hickory, cypress, dogwood, bay, laurel, satin wood, lignum vitæ, and maghogany. Long and short-staple cotton, Indian corn and rice, figs, limes, lemons, guavas, pomegranates, olives, grapes, pineapples, bananas, sugar cane, and tobacco are easily cultivated with excellent results. The excellent and almost inexhaustible pasture grasses of the s. and w. render the raising of neat cattle profitable. Altogether there are nearly 50,000 farms in the State, comprising more than 5,000 000 acres, of which more than one-fifth is improved land. The aggregate value of all farm property, including lands and improvements, implements and machinery, and live stock is nearly $60,000,000. The principal crops are corn, oats, sweet potatoes, cotton, and tobacco, and the principal orchard crops oranges and pineapples.

Manufactures.—The principal manufacturing products, according to the value of the output, are cigars and cigarettes, lumber and timber products, turpentine and rosin, railroad cars, planing-mill products, fertilizers, artificial ice, foundry and machine-shop products, and flour. The lumber industry includes the manufacture of pine lumber, cedar window sash, ship spars, live oak ship timber, pine orange boxes, and cedar cigar boxes. Other considerable industries are the production of naval stores, distilling of turpentine, evaporation of sea salt, taking and preparing sponges for market, preparation of alligator skins for the manufacture of boots and shoes, production of cotton-seed oil and oil-cake, fisheries, in the south, the manufacture of pal-

metto hats and braids, and coral fisheries. The fisheries of F. are the most extensive and valuable of those of any State south of Virginia, owing to the enormous coast line in the mid-continental seas.

Commerce.—There are 8 custom districts in the State, of which the most important are Fernandina, Tampa, and Pensacola, the latter being the seat of the lumber trade. The chief exports are cotton, lumber, oranges and other fruits, and fish. The total imports amount to about $5,000,000 annually and the exports to considerably over $20,000,000.

Railroads and Navigation.—The development of the railroad system in F. has been rapid of late. In 1885 there was little over 1,000 miles of track in operation, whereas the State to-day embraces about 500 miles of track, besides containing at least 10 street railway lines, whose aggregate track amounts to over 160 miles. The main lines of railway are the Atlantic Coast Line, the Seaboard Air Line, and the F. East Coast. There are steamer lines running from Jacksonville to Charleston, New York, and Boston; from Tampa to Havana and Porto Rico; from Key West to Havana, Galveston, New York, and New Orleans; and from Miami to Nassau and Cuba. There are also coasting lines from Fernandina, Apalachicola, Carrabelle, and Punta Gorda.

Finances and Banking.—The bonded debt of the State in 1910 was $601,567, and the State tax $7.50 per $1,000. There is no floating debt. There are several banks in the State, including national, State, and savings banks, besides loan and trust companies.

Religion.—The strongest denominations are the Methodist Episcopal, Baptist, Presbyterian, Roman Catholic, Protestant Episcopal and Congregationalist.

Education.—There are about 140,000 pupils in the public schools of the State, with over 3,500 teachers. There are also 2 normal schools, one for white and the other for colored persons, besides 3 institutions for secondary education, the State Agricultural College at Lake City, and seminaries at Gainsville, Tallahassee, and Bartow. Private secondary schools are maintained, together with several private and denominational colleges.

History.—It is believed that F. was discovered prior to 1500, though the earliest records extant give Juan Ponce de Leon, that restless searcher after the mythical fountain of perpetual youth, the credit of having first visited and named the portion of the coast now embraced within the limits of the state. He landed at St. Augustine on Easter Sunday, 1512, and named the territory F. either because of the day of his landing, the *pascua Florida* (flowery Easter), or of the great profusion of flowers that met his eye as he stepped ashore. He had no conception of the extent of the country about him, hence the name was without restrictions, and came to be

ON THE COAST OF FLORIDA

employed by early Spanish writers to designate a vast expanse lying n. and w. of the immediate vicinity of St. Augustine. A short time sufficed to convince him that he was as far away as ever from the coveted fountain of youth, and he left that region to explore others. In 1516, he returned, this time determined on discovering the *eldorado,* or land of fabulous wealth in gold and silver; made some fruitless journeys to the interior, and set sail for Cuba. After him came Vasquez, a Spaniard, 1520, Verrazzano, a Florentine, 1523, De Garay, a Spaniard, 1524, and Pamfilo de Narvaez, who received from Charles V. of Spain a grant of all land between Cape F. and Rio Panuco 1526. Narvaez landed with a considerable army at Appalachee 1528, was successfully resisted by the Indians, and, taking to his ships, was lost with all but 10 of his followers in a storm off Panuco. In 1539, Ferdinand de Soto made a landing, explored the country between the Atlantic and the Mississippi river with considerable thoroughness, and died without making any attempt at settlement 1542. During the next 20 years the Spaniards made numerous attempts to found settlements, the most successful of which was that directed by Pedro Menendez at a point just below the present St. Augustine, where a fort was built. Next came the expedition of French Protestants sent out by Admiral de Coligny, which was landed near Menendez's settlement 1563-4. In 1565, just as these refugees were beginning to experience relief from persecution, the Spaniards attacked them and, after killing nearly all, hung their bodies to the trees. 'Not as Frenchmen, but as heretics and enemies of God.' Menendez then left a garrison in the fort, and, moving n., founded St. Augustine and built another fort 1565. While engaged there, a French force under Dominique de Gourges was landed at the Huguenot settlement to avenge the Spanish murders. The garrison left by Menendez was attacked, captured, and hung on the same trees, to which an inscription was affixed 'Not as Spaniards, but as cutthroats and murderers.' In 1584, two English captains took possession of the n. coast portion in the name of England; and in 1586, Sir Francis Drake captured the fort and settlement at St. Augustine, which had been besieged unsuccessfully many times. Soon afterward, however, the place was restored to Spain, and, in the absence of records to the contrary, it may be assumed that during the ensuing century that country succeeded in holding it. In 1682, La Salle established several French settlements in w. F., now La.; 1696, a French settlement was made at Pensacola; 1702, an expedition from the Carolinas attacked St. Augustine without success; 1704, a similar expedition captured Fort St. Mark; 1739, during the war between Spain and England, Gov. Oglethorpe of Ga. led an unsuccessful expedition against St. Augustine; 1742, a Spanish force from Fla. took

Fort St. Simon and was investing Fort Frederica, Ga., when it was frightened off by Oglethorpe, 1763, Fla. was ceded by Spain to Great Britain in exchange for Cuba; the territory was divided into two provinces, with the Appalachicola river as the boundary, and a number of colonies were established under a royal proclamation; 1778, Gen. Provost marched from Fla. and captured Savannah and other Ga. towns; 1779, the Spaniards successfully besieged Baton Rouge, and 1781, May, captured Pensacola. The treaty of 1783 restored Fla. to Spain. In 1803, the portion w. of the Perdido river became a possession of the United States by its treaty with France. Pensacola and Fort St. Mark were occupied by the British 1812, captured by Gen. Jackson 1818, and soon afterward restored to Spain. In 1819, negotiations were concluded between Spain and the United States for the cession of Fla. to the latter, and 1821, July, formal delivery was made. The acquisition was organized as Florida Territory 1822, and inducements to settlement were offered by the govt. A considerable immigration set in, but the hostility of the Seminole Indians (q.v.), who occupied the best lands, prevented any material development, and it was not till after the costly seven-years' war upon them 1835-42 and the removal of the greater part of the tribe to Indian Terr. that the population began to show substantial increase. In 1845, the territory was admitted as a state into the Union. The civil war history of Fla. comprises the passage of the ordinance of secession 1861, Jan. 10; the occupation by the state authorities of Fort Marion and the St. Augustine and Chattahoochee arsenals Jan. 7; and the navy-yard and forts at Pensacola, Jan. 12; the capture and subsequent possession by the national forces of Fernandina, St. Augustine, Jacksonville, and other places of importance on the Atlantic coast 1862; and the battle of Olustee, 1864, Feb. In 1865, Pres. Johnson removed the restrictions on commercial intercourse with Fla., Apr. 29, and appointed a provisional govt. July 13. The ordinance of secession was repealed Oct. 28, civil authority was recommitted to state officers 1866, Jan.; a new constitution was ratified by the people 1868, May, the 14th amendment to the federal constitution was adopted June 1, and the state readmitted to the Union July 4.

Government.—The executive authority is vested by the constitution in a gov. elected for 4 years, who must be a qualified elector, a resident of the U. S. 9 years and of F. 3 years prior to the time of his election; and a lieut.-gov. elected for the same period. The state officers are: sec. of state, treas., comptroller, attor.-gen., supt. public instruction, surveyor-gen., adj.-gen., collector internal revenue, and commissioner of emigration. The legislative authority is vested in a senate of 32 members and house of assembly of 68, whose members receive $6 per day and at the rate of 10 c. mileage; the judicial

1. THE PLAZA, ST AUGUSTINE, FLORIDA. 2. JUPITER LIGHT, FLORIDA

authority is vested in a supreme court, circuit courts, co. courts, and justices of the peace.

The successive governors with their terms of office are as follows: *Territorial*—Andrew Jackson 1821-2, William P. Duval 1822-34, John H. Eaton 1834-6, Richard K. Call 1836-9, Robert R. Reid 1839-41, Richard K. Call 1841-4, John Branch 1844-5; *State*—William D. Mosley 1845-9, Thomas Brown 1849-53, James E. Broome 1853-7, Madison S. Perry 1857-61, John Milton 1861-65, William Marvin (provisional) 1865-6, David S. Walker 1866-8, Harrison Reed 1868-73, O. B. Hart 1873-4, M. L. Stearns 1874-7, George F. Drew 1877-81, William D. Bloxham 1881-5, E. A. Perry 1885-9, Frank P. Fleming 1889-93, Henry L. Mitchell 1893-7, William D. Bloxham, 1897-1901, William S. Jennings 1901-5, N. B. Broward 1905-7; Albert W. Gilchrist, 1907—.

Politics.—F. has 5 electoral votes. The votes for pres. have been as follows: 1848, Taylor and Fillmore; 1852, Pierce and King; 1856, Buchanan and Breckinridge; 1860, Breckinridge and Lane; 1864, no vote; 1868, Grant and Colfax; 1872, Grant and Wilson; 1876, Hayes and Wheeler (see ELECTORAL COMMISSION); 1880, Hancock and English; 1884, Cleveland and Hendricks; 1888, Cleveland and Thurman; 1892, Cleveland and Stevenson; 1896, Bryan and Sewall; 1900, Bryan and Stevenson; 1904, Parker and Davis.

Population.—(1840) 54,477; (1850) 87,445; (1860) 140,424; (1870) 187,748; (1880) 269,493; (1890) 391,422; (1900) 528,542; (1910) 751,139.

FLORIDA, GULF OF: name given to the channel between Florida and the Bahamas, traversed by the Gulf Stream (q. v.). From Florida Reefs on the s. to Settlement Point, most northern of the Bahamas, the channel is 200 m. long; greatest breadth at the s. extremity, 150 m.; at the n. extremity, 65 miles.

FLORIDA BLANCA, *Flo-rē'thâ blân'kâ,* DON JOSEFO MONINO, Count of: prime minister under Charles III. of Spain: 1728-1808, Nov. 20; b. Murcia, where his father was a notary. Having studied at Salamanca, he soon gained such distinction that he was appointed Spanish ambassador to Clement XIV. of Rome. In that office, he showed great ability, especially in the abolition of the order of Jesuits and the election of Pius VI. Monino, whom the king created count of Florida Blanca, succeeded Grimaldi as Spanish minister of foreign affairs, and was given charge also of the department of matters of justice and mercy, as well as the superintendence of posts, highways, and public magazines. F. used this extensive authority in introducing post-coaches and good post-roads, attending to important departments of general police, and actively promoting the arts and sciences. His effort to confirm the good understanding between Spain and Portugal by a double marriage, which would have secured the Portuguese throne to a

Spanish prince, was unsuccessful. His military undertakings also, the attack upon Algiers 1777, and the siege of Gibraltar 1782, issued unfortunately. Before the king's death 1788, Oct., F. presented a defense of his administration, with a request for leave to resign. The defense was accepted, but the request refused. However, under Charles IV. 1792, F.'s enemies obtained his disgrace. Imprisoned at first in the citadel of Pampeluna, he was afterward released, and banished to his estates. He appeared again at the meeting of the cortes 1808, but died November 20 of the same year.

FLORIDA KEYS: cluster of small islands of coral formation and of sandbanks, almost continuous in range, extending in the form of a bow from Cape Florida in a s.w. direction 220 m. They are partly in Dade and partly in Monroe co., and are very numerous. The extreme w. group is the Dry Tortugas (q.v.), and the most important of the others are Cayo Larga and Cayo Hueso, known also as Bone Key, Thompson's Island, and Key West. The latter contains the city of Key West. The F. K. in the main are very rocky, lie but a few feet above tide water, and are covered with pine, buttonwood, sweet bay, palmetto, and other trees. Some have a soil in which tropical fruits thrive; others are wholly barren: and one, Salt Key, derives its name from a large lake of exceedingly salt water.

FLORID COUNTERPOINT: in *mus.*, counterpoint not confined to any special species, but in which notes of various lengths are used. It is opposed to strict counterpoint: see COUNTERPOINT.

FLORID'EÆ: see CERAMIACEÆ.

FLORID GOTHIC: in *arch.*, florid English or Tudor, the latest development of the Gothic style in England: the period is 1400–1537.

FLORIDIA, *flo-rē'dē-â:* town of Sicily, 7 m. w.n.w. from Syracuse; in a wide plain, amidst vineyards, olive-groves, and corn-fields. Pop. 8,500.

FLORIN, n. *flŏr'ĭn* [F. *florin*—from It. *florino:* Ger. *floren*]: gold coin struck first in Florence (q.v.) in the 13th c.; of the size of a ducat, and having on one side a lily, and on the other the head of John the Baptist. Some derive the name from the city, others from the flower. These coins were soon imitated all over Europe. From them the German gold guldens of the middle ages and the modern guldens arose: the last are still marked by the letters *Fl.* The gulden or florin is the unit of account in Austria, and has a value of about 48 cents. Till 1875 an F. or gulden of abt. 40 cents was the unit in the s. German states. The Dutch F. or guilder also is worth abt. 40 cents. The English 2s. (= abt. 48 cents) piece is called florin.

FLORINIANS, *flo-rĭn'ĭ-anz:* Gnostic sect of the 2d c.: so called from a Roman priest, Florinus, who, with his fellow-presbyter Blastus, introduced doctrines resembling those of Valentinus, into Rome, in the pontificate of Eleutherius (176), and was excluded from communion by that pontiff see GNOSTICISM: VALENTINIANS.

FLOR'ISTS' FLOW'ERS: kinds of flowers which have been cultivated with peculiar care, and of which, consequently, there exist numerous varieties, differing very much in appearance from each other and from the original flower Such are tulips, hyacinths, roses, auriculas, carnations, anemones, ranunculuses, dahlias, etc. The special cultivation of particular flowers was prosecuted to a remarkable degree in Europe first by the Dutch in the beginning of the 17th c., and from the Netherlands a passion for it extended to other countries, particularly England and Scotland, when the religious persecutions drove many refugees to the British shores; and to this day it prevails most where the branches of manufacture introduced by the refugees are carried on. In the little gardens of operatives in some manufacturing towns are seen many of the finest tulips and carnations in Britain. It is still, however, in Holland, particularly at Haarlem, that this branch of gardening is carried on to the greatest extent, and it is from that quarter chiefly that the market of the world is supplied with bulbs, seeds, etc. Between Alemsei and Leyden are more than 20 acres appropriated to hyacinths alone, which succeed best in a loose sandy soil. The cultivation of roses at Noordwyll, s. Holland, is carried on in considerable fields situated in the *dunes*, and affords support to many families. Berlin has of late years become the seat of a flower-trade, which partially rivals that of Holland. Some flowers, as dahlias and hollyhocks, are produced in greatest perfection by British cultivators; some others by American florists. The Chinese have had their florists' flowers, camellias, hydrangeas, tree peonies, etc., from time immemorial.

In 1636–7, an extraordinary flower-mania prevailed in Holland, with reference chiefly to tulips, in which men speculated as recently in railway shares. Bulbs were sold for enormous sums. For a single *Semper Augustus* (a tulip), 13,000 florins were once paid, and for three such together, 30,000 florins. The ownership of a bulb was often divided iuto shares. Men sold bulbs, which they did not possess, on condition of delivering them to the buyers within a stipulated time; and of some varieties, far more bulbs were sold than actually existed. But these extravagances soon ceased, though not till they had involved many persons in ruin.—It was not till about 1776 that the real flower-trade of Holland reached its greatest importance; from which time it has rather declined. New varieties of tulips and hyacinths are sometimes marked in the Haarlem catalogues at prices from 25 to 150 florins.

FLORUS, *flō'rŭs:* generally, but on insufficient evidence, called L. Annæus F.: Roman historian in the reign of Trajan or Hadrian. Of his life we know nothing. He wrote an epitome of Roman history (*Epitome de Gestis Romanorum*), from the foundation of the city to the time of Augustus. This work, which is extant, is carefully and intelligently composed, but is disfigured by an inflated and metaphorical style. Since the *editio princeps*—if, indeed, it be such—printed at the Sorbonne 1471, F.'s epitome has been pub-

lished times without number. The best modern editions are those of Jahn (Leip. 1852) and Halm (1854).

FLOSCULAR, a. *flŏs′kū-lėr*, or FLOS′CULOUS, a. *-lŭs* [L. *floscŭlŭs*, a little flower—from *flos*, a flower]: in *bot.*, applied to the corolla of a floret when tubular. FLOS′CULE, n. *-kūl*, the partial or lesser floret.

FLOSCULARIDÆ, n. *flŏs-kū-lär-ī′dē* [L. *flosculus*, a little flower]: family of rotifera, order *Sessilia;* distinguished by having bent spiniform teeth at the orifice of the œsophagus.

FLOS-FERRI, n. *flŏs-fĕr′rĭ* [L. *flos*, a flower; *ferri*, of iron]: a mineral, a fine radiated variety of arragonite—so named because of its frequent association with iron ore.

FLOSH, n. *flŏsh* [probably connected with Ger. *flosse*, a trough in which ore is washed]: in *metal.*, a hopper-shaped box in which ore is placed for the action of the stamps.

FLOSS, n. *flŏs* [It. *floscio;* Venet. *flosso;* Piedm. *flos*, faint, drooping: F. *flosche*, weak, soft: Lang. *flosso*, soft untwisted silk]: the downy or silky substance found in the husks of certain plants. FLOS′SY, n. *-sĭ*, soft and silk-like. FLOSS-SILK, a kind of loose inferior silk, obtained from the external envelope of the silkworm's cocoon and from the downy silk waste broken in reeling. Macerated in water, pressed and dried, it is spun into yarn for the coarser silk or mixed goods.

FLOTAGE, n. *flō′tāj* [F. *flottage*, rafting, buoyancy—from *flot*, a wave, a billow (see FLOAT, and FLEET 1 and 2)]: the act of floating; that which floats. FLOT′ANT [F.]: in *heraldry*, said of an object flying in the air, as a banner-flotant. FLOTATION, n. *flō-tā′shŭn*, the act of floating; the science of floating bodies. FLOTSAM, n. *flŏt′săm*, n. or FLOAT′SAM, n. *-săm*, and FLOT′SON, n. *-sŭn* [Icel. *floti*, a float, a raft, *samr*, together, like]: goods cast out in shipwreck, by force of the wind or sea, and found floating without an owner on a river or sea—*jetsam*, goods found sunken in the water, or washed ashore, without an owner; applied also to things thrown out of a ship to lighten it in time of danger, known more distinctively as *jettison* (see JET 1: JETTISON): a third classification is *ligan*, goods sunken in the sea, but with a cork, bladder, or buoy attached for recovery.—In *law*, goods abandoned under such circumstances are termed *derelict* (q.v.); they may be saved by any person, and such person can recover for his services a varying proportion of their value. (See SALVAGE; WRECK.)

FLOTILLA, n. *flō-tĭl′lă* [Sp. *flotilla;* F. *flottille*, a squadron: dim. of Sp. *flota;* OF. *flote*, a fleet: Icel. *floti*, a raft, a fleet]: a fleet of small vessels.

FLOTOW, *flō′tō*, FRIEDRICH, Freiherr von: 1812, Apr. 27—1883, Jan. 24; b. Rentendorf in Mecklenburg: German operatic composer. He was intended for the diplomatic profession; but turned to a musical career, and took lessons

in composition from Reicha, in Paris. His earlier operas were refused by the managers of the Paris theatres; and his reputation was established first by his music to *Le Naufrage de la Méduse*, 1839. He composed many light operas including *Le Forestier*, *L'Esclave de Camoëns*, *Alessandro Stradella*, *L'Ame en Peine*, *Martha*, *Rübezahl*, and *Zilda*, which attained popularity in France and in Germany, and are characterized by easy and lively dramatic action, readiness of invention, pleasing melody, and graceful instrumentation. His reputation rests mainly on *Martha*, which remains a great favorite. Later works were *Indra* and *L'Ombre* (1869). Flotow was intendant of the theatre at Schwerin 1855–63, and died at Wiesbaden.

FLOTSAM, JETSAM, and LIGAN, in law, flotsam, or floatsam, is derelict or shipwrecked goods floating on the sea; jetsam, goods thrown overboard which sink and remain under water; and ligan, goods sunk with a wreck or attached to a buoy, as a mark of ownership.

FLÖTZ, n. *flĕts* [Ger. level]: in *geol.*, a term applied by Werner to the secondary strata of Lehmann, because in the district in which he examined them they were horizontal. But, as the horizontal position of the flötz was found to be a local accident, the term has been abandoned, giving place to secondary.

FLOUNCE, n. *flowns* [F. *froncis*, a plait, a wrinkle: Dut. *fronsse*, a wrinkle]: a loose flap sewed outside the skirt of a lady's dress: V. to adorn with flounces. FLOUNCING, imp. *flown'sĭng*. FLOUNCED, pp. *flownst*.

FLOUNCE, v. *flowns* [Norw. *flunsa*, to do anything with noise and bluster: Sw. *flunsa*, to plunge in water: Dut. *flansen*, to do in a hasty, careless way]: *literally*, to be in a toss and fume with anger; to throw the limbs and body one way and the other: N. a sudden jerking or tossing motion of the body, indicating impatience. FLOUN'CING, imp. FLOUNCED, pp. *flownst*.

FLOUNDER, v. *flown'dėr* [a nasalized form of Dut. *flodderen*, to make a flapping or fluttering motion, as loose garments: Ger. *flünder*, to flounder: comp. Sw. *fladdra*, to flutter]: to struggle, roll, or toss, as a horse in the mire. FLOUN'DERING, imp. rolling, tossing, and tumbling, as in mire. FLOUN'DERED, pp. *-dėrd*.

FLOUNDER, n. *flown'dėr* [Sw. *flundra;* Icel. *flydra*, a flounder—from the flapping motion of the fish (see FLOUNDER 1)], (*Platessa*): genus of fishes, of the Flat-fish family (*Pleuronectidæ*), having one row of cutting teeth in each jaw, and generally pavement-like teeth on the pharynx; the dorsal and anal fins extending nearly the whole length of the body, the dorsal not coming farther forward than the centre of the upper eye; the tail-fin distinctly separated both from the dorsal and from the anal. To this genus belong the plaice, flounder, dab, etc. The species generally known as the flounder (*P. Flesus*), is common on many shores. Its Swedish name is *Flundra*. Its Scottish name

is *Fleuk*, or *Fluke*, a name which, with additions, is extended to many other kinds of flat-fish. The flounder is often a foot or more in length. Its greatest breadth, without the fins, is about one-third of the whole length, rather less than that of the plaice. It is easily distinguished from the plaice by a row of small tubercles on each side of the lateral line. The color varies according to the ground from which the fish is taken. The flounder is found chiefly in rather shallow water, with sandy or muddy bottom, and equally in the most salt water and in the brackish water of estuaries. It ascends still rivers into perfectly fresh water, and may be kept in fresh-water ponds. It lives long out of water, and is easily transferred to ponds. The flounder, like the other fishes of this genus, generally swims on the left side, and has the eyes on the right side; but reversed specimens are frequent.

FLOUR, n. *flŏw'r* [F. *fleur*, flower, blossom; *fleur de farine*, blossom of meal, flour]: the fine sifted part of ground wheat or other pulverized grain (see BREAD: MILL). FLOU'RING, n. the business of converting grain into flour. FLOURY, n. *flŏw'rĭ*, resembling flour. NEW PROCESS FLOUR, flour made by crushing the grain between sets of revolving rollers. In 1880 many mills adopted the system and it is now used in the largest and best equipped flouring establishments in the country. The rollers are arranged in pairs, with spiral grooves of various degrees of depth and fineness, and revolve toward each other. Grain passing between the rollers, the grooves of which cross at an angle, is gradually crushed, thus making possible a nearly complete separation of the nutritive from the waste portions. After bolting, the middlings are passed between smoother rolls and a nutritive grade of flour is obtained. SELF-RAISING FLOUR, flour prepared by the addition to ordinary flour of substances which combined and moistened have the efficiency of yeast, but which remain inert while dry. Thus the delay attending the action of yeast is avoided. The development of carbonic acid gas, which makes the bread light, is secured by the action of an acid upon bicarbonate of soda or a similar alkali. The materials, forming a neutral compound, are intimately mixed with each other and with the flour. By merely adding water the flour is made ready for baking. The original process of preparing the flour, developed in England, was to mix flour and tartaric acid, and with another quantity of flour mix bicarbonate of soda. When these two lots were thoroughly mixed with each other the flour was ready for sale. In this country acid phosphate of lime, in a finely pulverized form, is used to some extent in place of tartaric acid or cream tartar. It is said to be equally efficient and to supply to the flour nutritive matters which have been removed in the bran. Under the name of baking powders the materials used in self-raising flour can be obtained and added to the flour at the time of baking.

FLOUR, ST., *flôr:* a small town of France, dept. of Cantal,

finely situated on a steep basaltic plateau at an elevation of 3,000 ft. 34 m. e.n.e. of Aurillac. The principal building is the cathedral. St. Flour has manufactures of hollow ironware, cloth, and table-linen. Pop. 5,000.

FLOURENS, *flô-rŏng*, MARIE JEAN PIERRE: 1794–1867, Dec. 6; b. at Maureilhan, Hérault: physiologist. After having obtained his degree M.D. at Montpellier, at the early age of 19, he went to Paris, where he soon became acquainted with the Cuviers, Geoffroy St. Hilaire, and other eminent naturalists. For more than 40 years, Flourens was a voluminous writer on human and comparative anatomy and physiology, on natural history, and on various special departments of sciences. Among his most important works are: *Recherches Expérimentales sur les Propriétés et les Fonctions du Système Nerveux dans les Animaux Vertèbres* (1824); with a supplementary vol. *Expériences sur le Système Nerveux* (1825); *Recherches sur le Développement des Os et des Dents* (1842); *Anatomie Générale de la Peau et des Membranes Muqueuses* (1843) tending to demonstrate the unity of the human race, by showing that there are no essential differences between the structure of the skin in the negro and the European; *Théorie Expérimentale de la Formation des Os* (1847), perhaps the most celebrated of his works. Among his smaller and popular works are: *Analyse Raisonnée des Travaux de Georges Cuvier* (1841); *Buffon, Histoire de ses Idées et de ses Travaux* (1844); *De l'Instinct et de l'Intelligence des Animaux* (1841); *Examen de la Phrénologie* (1842); *Histoire de la Découverte de la Circulation du Sang* (1854); *De la Longévité Humaine, et de la Quantité de Vie sur le Globe* (1854); and *Eloges Historiques*. As early as 1821, Flourens delivered a course of lectures on 'The Physiological Theory of Sensations,' and presented some of his first scientific contributions to the Acad. of Sciences, into which body he was admitted 1828 About this date, he was appointed assistant to Cuvier, and 1832 he succeeded to the full duties of prof. of natural history in the Jardin du Roi. In 1833, he succeeded Dulong as perpetual sec. of the Acad. of Sciences and 1840 the French Acad. elected him a member. He was made a peer of France by Louis Philippe 1846, and was appointed prof. in the College de France 1855.

FLOURISH, v. *flŭr'ĭsh* [L. *flōres'cĕrĕ*, to begin to bloom —from *flos*, a flower: F. *fleurir*, to blossom; *fleurissant*, flourishing]: *literally*, to come out in blossom; to thrive; to prosper; to adorn with flowers; to wave or brandish; to embellish or adorn: N. blossom; showy splendor; parade of words; a sounding as of trumpets; a bold stroke in writing; in *OE.*, beauty; bravery. FLOUR'ISHING, imp.: ADJ. thriving; prosperous; making a show. FLOUR'ISHED, pp. *-ĭsht*. FLOUR'ISHINGLY, ad. *-lĭ*.—SYN. of flourish, v.': to vaunt; boast; adorn; ornament; embellish; swing; brandish.

FLOUT, v. *flowt* [Dut. *fluyten*, to whistle, to flatter:

Scot. *flyte,* to scold]: to mock: to treat with contempt: to jeer: N. a mock; an insult. FLOUTING, imp. FLOUTED, pp. FLOUT'INGLY, ad. *-lĭ.*

FLOW, v. *flō* [AS. *flowan;* Dut. *vloeden,* to flow: L. *fluĕrĕ,* to flow—allied to FLEET and FLOOD, which see]: to move along, as water; to run, as a liquid; to rise, as the tide; to issue, as from a source; to glide along smoothly; to hang loose and waving, as a mantle: N. rise of water, as opposed to a *fall;* a stream; copiousness, as a flow of language; sudden plenty or abundance. FLOW'ING, imp.: ADJ. running, as water; fluent or smooth: N. act of running, as water; great rise or abundance, as of water. FLOWED, pp. *flōd.* FLOW'INGLY, ad. *-lĭ.* FLOW'AGE, n. *-āj,* act of flowing; an overflowing with water; the water which has overflowed.—SYN. of 'flow,v.': to move; change; melt; glide; proceed; abound; rise; inundate; flood; cover; arise; spring; emanate.

FLOWER, n. *flow'r* [OF. *flour*; F. *fleur*—from L. *flōrem,* flower, blossom]: blossom; the bloom of a plant; the best or finest part of a thing, as flower of age, an army, etc.: V. to blossom or bloom; to adorn with flowers. FLOWERING, imp. *flow'ĕr-ĭng:* ADJ. blossoming; blooming: N. act of blossoming; the season when plants blossom; act of adorning with flowers. FLOWERLESS, a. *flow'ĕr-lĕs,* destitute of flowers. FLOWERS, n. plu. *flow'rz,* in *chemistry,* name formerly used for fine mealy matter, as *flowers of sulphur, of antimony, of arsenic,* etc.; the term was given originally by the alchemists to the sublimates which rose, or appeared to grow from certain bodies capable of volatilization when subjected to heat. FLOWERED, pp. *flow'rd:* ADJ. embellished with figures of flowers. FLOWERY, a. *flow'ĕr-ĭ,* full of or adorned with flowers; ornate, as applied to language. FLOW'ERINESS, n. FLOWERET, n. *flow'ĕr-ĕt,* a little flower. FLOWER-DE-LUCE, n. *flow'r-dĕ-lôs'* [F. *fleur-de-lis,* flower of the lily]: the iris; corn-flag; an heraldic device representing a lily: see IRIS: FLEUR-DE-LIS (emblem). FLOWER-GARDEN: see FLORICULTURE.

FLOW'ER, or BLOS'SOM: that part of a phanerogamous seed-bearing plant in which the organs of reproduction (*stamens* and *pistils*) are situated. These are generally surrounded by other parts, called *floral envelopes* (the *calix* and *corolla*). Both the organs of reproduction and the floral envelopes are looked upon as metamorphosed leaves; that is, in the course of plant development, these parts have arisen as leaves but in modified form to meet the functions of reproduction. They arise in successive whorls from a much shortened axis, called the *thalamus* (Gr., a nuptial-bed), or *torus* (Lat., a couch). Flowers are sometimes closely attached to the stem or branch from which they grow, and are then said to be *sessile* (Lat., sitting;) but sometimes there intervenes *a flower stalk* or *peduncle,* either simple or branched. The whole assemblage of flowers of a plant is called its *Inflorescence* (q.v.), and the kinds of inflorescence, or modes in which

the flowers are produced and grouped, in different plants, are often as characteristic as the diversities in the flowers themselves, though the latter are usually more important in determining botanical affinities.

In the large nat. ord. *Compositæ*, many small flowers are congregated on a common *receptacle*, and surrounded with *bracts* in the form of an *involucre*, as a single flower is surrounded by its calyx. The *head of flowers* is in this case popularly called a flower; and the individual flowers of which it is composed are by botanists styled *florets*. This term is applied also to the individual flowers in the *spiklets* of the grasses (q.v.), for which the *glumes* form a common involucre.

The order of the whorls in flowers is invariable: the Calyx (q.v.) is always exterior to the Corolla (q.v.); within

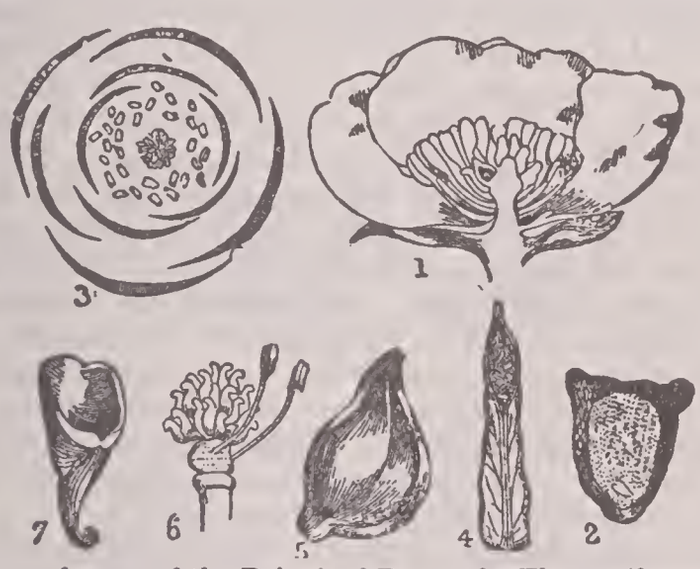


Illustration of some of the Principal Parts of a Flower (from Balfour's *Botany*):

1, Section of the flower of Ranunculus, showing sepals, petals, numerous stamens, with adnate anthers, placed below the carpels. 2, Anatropal seed of Aconite, cut vertically, showing abundant homogeneous albumen and a small embryo. 3, Diagram of the flower of Ranunculus, with five sepals, five petals, numerous stamens, and carpels. 4, Ripe follicle of Columbine. 5, Ripe achene of Ranunculus. 6, Numerous single-seeded carpels of Ranunculus. 7, Spurred petal of Columbine.

the corolla are the *Stamens* (q.v.), or male organs of reproduction, and in the centre of all is the *Pistil* (q.v.), the female organ of reproduction. An outer whorl, exterior to the calyx, and usually of smaller parts, is found in some flowers, as in the mallows, and is called the *epicalyx*. Within the corolla, there is sometimes an additional or supplementary corolla, called the *Corona* (q.v.) *coronet*, or *crown*. When the calyx and corolla are not easily distinguishable, the term *Perianth* (q.v.), or *perigone*, is employed, as in the lily, crocus, iris, and the greater number of endogenous plants, although even in these there are really two whorls closely united. In some flowers, there are several whorls of leaves forming one or each of the floral envelopes; and in like manner, some have several whorls of stamens, and sometimes there are several whorls

of the carpels which form the pistil. In some flowers, certain whorls are entirely wanting; thus, not a few exogenous plants are destitute of the corolla and, in cases, the calyx also. Such groups of plants are described as *apetalous*. By a similar abortion of a whorl flowers become unisexual. When stamens and pistils are present in the same flower, it is called a *hermaphrodite* or *perfect* flower; but many flowers contain only the male organs of production, and many contain only the female organs, and such flowers are described as *unisexual*, *diclinous* (q.v.), or *imperfect*, and respectively, as *male* or *staminiferous*, and *female* or *pistilliferous* flowers. Male flowers are called also *barren* or *sterile*, and female flowers *fertile*, though their fertility depends on the communication of pollen from the staminiferous flowers. When both male and female flowers are produced on one plant, the specie is said to be *monœcious* (Gr., having one house); but when they are on separate plants, it is *diœcious* (Gr., having two houses). Those which produce male, female, and hermaphrodite flowers are called *polygamous*. Sometimes both stamens and pistils are wanting, and the flower is then said to be *neutral* or *empty*, as in the case of the florets of the ray in many composite flowers. Sometimes, on the contrary, both calyx and corolla are wanting; and then the flower is said to be *naked*, or *achlamydeous* (Gr., without covering), as flowers having only one floral envelope are called *monochlamydeous*, and flowers having both calyx and corolla are called *dichlamydeous*. Achlamydeous flowers are often grouped in some peculiar manner, and protected by bracts or by a spathe.

Flowers are always regular in their rudimental state—whorls of elevated points or *papillæ;* some of these, however, are frequently abortive, while more frequently some acquire greater development than others of the same whorl, making the whorl and the flower *irregular;* and greater varieties of form are common in the metamorphosed leaves which compose the flower, than in true leaves themselves. The *internodes*, or portions of the axis between the whorls, are sometimes also peculiarly developed into *Disks* (q.v.), *Gynophores*, etc. The whorls often differ in the arrangement of parts in the bud, *Æstivation* (q.v.). But a beautiful symmetry may generally be traced in the arrangement of the parts of flowers, the whorls consisting of the same number of parts, and the parts of each whorl being opposite to the spaces of the whorl exterior to it; and this symmetrical plan remains manifest even when there is abortion or extraordinary development of particular parts. The number of parts in the pistil is, however, often smaller than in the exterior whorls; and sometimes particular parts appear to be divided, and so apparently multiplied, as the long stamens of the *Cruciferæ*, each pair of which is to be regarded as one stamen split into two, and has its place accordingly among the parts of the flower. The symmetry of flowers is illustrated by the diagrams on the next page

The development of flowers in most cases follows the complete formation of the stem-leaves; more rarely precedes or accompanies it. The unfolding of the parts of a flower is called its *flowering* or *blossoming*, and, when their functions are performed, it fades; the floral envelopes, the stamens, and even the styles, sometimes fall off early, and some of them sometimes remain in a withered state until the ripening of the fruit, and the calyx frequently undergoes such modifications as to convert it into a part of the fruit itself. In the greater number of plants, flowering takes place indiscriminately at all hours of the day and the flowers, once opened, remain open, even during night, till they fade. In many plants, however, a *sleep of flowers* takes place; they open and close with the returns of day and night. Thus, *sunflowers* open in the morning, and close at evening; while there are other flowers which open in the evening, and close at morning. Others open

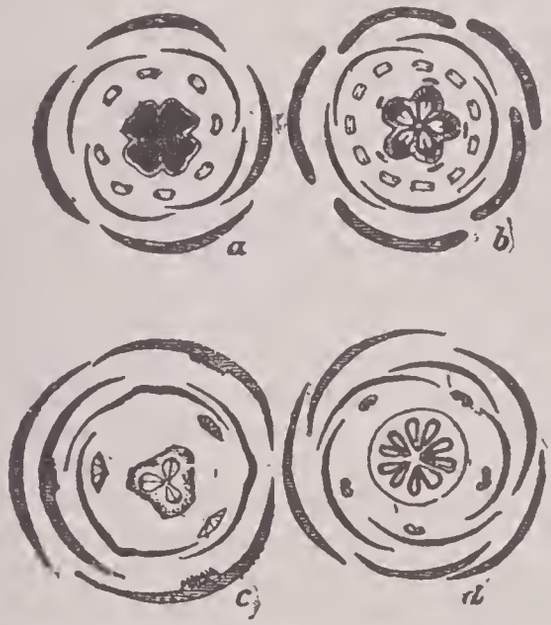


Illustration of the Symmetry of Flowers (from Balfour's *Botany*): *a*, Diagram of the flower of Heath (*Erica*), having four sepals, four divisions of the corolla, eight stamens in two rows, and four divisions of the pistil. The flower is tetramerous, complete, symmetrical, and regular. *b*, Diagramatic section of a symmetrical pentamerous flower of Stone-crop (*Sedum*), consisting of five sepals externally, five petals alternating with the sepals, ten stamens in two rows, and five carpels containing seeds. The lines on the outside of the carpels are glands. *c*, Diagram of the trimerous symmetrical flower of Iris. There are three alternating divisions of each whorl. *d*, Diagram of the flower of Flax (*Linum*), consisting of five sepals, five petals, five stamens, and five carpels, each of which is partially divided into two. It is pentamerous, complete, symmetrical, and regular.

and close at certain hours of the day; thus, the flowers of the common purslane open about 11 A.M., and close soon after midday; *Anthericum pomeridianum* opens its flowers about 2 P.M., and closes them before night; the large fragrant blossoms of night-blooming cereus—*Cereus grandiflorus*—open between 7 and 8 P.M., and its sleep commences soon after midnight. In a few plants, the sleep-

ing and waking of the flowers are regulated by the conditions of the weather. The waking and sleeping of flowers either continues for several days in succession, as in some species of *Mesembryanthemum;* or the brief life of the flower ends when it first sleeps, as in the Tiger-flower.

The odors of flowers, extremely various, often delightful, sometimes very offensive, are in some cases evenly powerful as long as the flower is open; in others, they vary in strength at different times of the day. Some flowers, as those of *Hesperis tristis* and *Pelargonium triste*, though remaining open during the day, diffuse their fragrance only when night comes on. The Oriental Hyacinth, commonly cultivated in windows, is at all times perceptibly fragrant, but fills the apartment with its perfume about eleven o'clock at night.—The colors of the different parts of flowers generally remain unchanged, but sometimes undergo changes during the life of the flower. The flowers of *Myosotis versicolor*—a small species of Forget-me-not, very common as a weed in gardens—are sulphur-yellow when they first open, and afterward change to blue. The petals of *Cheiranthus mutabilis*, when they first expand, are yellow, and afterward pass to orange, red, and finally purple. In *Hydrangea hortensis*, familiar as a window-plant, the flowers are at first green, then rose-color, purplish red intermixed with green, and finally when about to fade, of a sickly green. Some flowers undergo remarkable changes of color during the day as those of the common pink *Phlox*, which, early in the morning, are light blue, and become bright pink as the day advances; and those of *Hibiscus variabilis*, white in the morning, pink at noon, and bright red at sunset. The colors and odors of flowers are subjects in the investigation of which physiologists have not yet been able to go far. The chemical products on which they immediately depend are partially known; but how the chemical changes are wrought, and what various purposes they all serve as to the plant itself, have not been fully ascertained, though in certain cases, it is evident that they serve as agencies or aids to fertilization by attracting insect visitors. Both colors and odors are due more or less to the action of the sun's rays. They are also sometimes modified by soil; and diversities of color have been obtained in cultivated flowers by changing the soil in which they grow. A few flowers are edible, and some are of importance on this account as for example, the cauliflower. Some, or parts of them, are used in dyeing; but, notwithstanding the beauty and variety of the colors of flowers, a very small proportion of vegetable dye-stuffs is obtained from them. Comparatively few flowering parts are used in medicine, though they form a part of certain official drugs. For dyeing and painting the colors of flowers can seldom be obtained in considerable quantity, except at too great expense.

FLOWER BEETLES: scarabeid beetles of several genera. One of the most abundant and destructive of these insects is the rose-chafer which annually does great damage to roses and other flowers and fruits. Several species of the genus *Euphoria*, more especially *E. inda*, is frequently found on flowers eating pollen, but it also attacks corn in the milk, and eats into various forms of fruit. Other flower beetles belonging to the genera *Hoplia* and *Trichius* are commonly found on flowers throughout the country and take some part in the cross-fertilization of useful plants. Numerous other beetles frequent flowers, among which are beautiful species of the genera *Clerus* and *Trichodes* of the *Cleridæ; Leptura* and many related genera of long-horned beetles; and many genera of small families such as the *Mordellidæ*.

FLOWER-PECKERS, general name for a large family (*Dicæidæ*) of small insectivorous birds allied to the creepers which get their food largely by searching flowering plants and their blossoms, picking up minute insects largely by aid of a curious tongue which is separated at the end into four tubular projections. They inhabit the Indo-China region and thence throughout the archipelagoes to Australia, where the white speckled diamond-birds (*Paradalatus*) and the swallow-dicæum (*Dicæum erythrorhynchum*) are familiar friends of the gardener. Some make extremely beautiful, highly decorated nests, while others are content to deposit their eggs in holes in trees, or earthern banks, or old birds' nests.

FLOW'ER-POTS: small receptacles, filled with soil, for growing plants; made usually of burnt clay, unglazed, tapering a little toward the bottom, and having the bottom perforated with one or more holes. Those of smallest size (*thumb-pots*) are only about two inches deep, and are chiefly for seedings soon to be transplanted. For plants which require a pot more than 12 inches deep and 18 inches wide, wooden boxes or tubs are generally used. For ornamental use, flower-pots are sometimes glazed, or made in the shape of vases, etc.

FLOW'ERS, Artificial: branch of manufacture, intermediate between the fine and the mechanical arts. The Italians were the first to bring it to a high state, and it is now far advanced in France, England, and the United States.

The materials used are various. Feathers have long been used by the American Indians. In Italy, the cocoons of silk-worms are dyed and extensively used. Beautiful imitations of flowers are made from shells, either in their natural colors or tinted. Paper, ribbons, velvet, thin laminæ of whalebone, etc., also are used. The materials of which A. F. commonly in use are made, are French cambric, Scotch cambric, jaconet, and fine calico, besides muslin, crape, and gauze for particular flowers, and satin and velvet for thick petals, etc. Wax-flower making is a distinct branch, and those who follow it claim the title of

artist: see WAX FLOWERS.—The petals and sepals of the flowers, as well as the leaves of the plant, are stamped out by punches, or 'irons,' as they are technically termed. A large stock of these irons is necessary, as special forms and sizes are required for each flower. The next process in shaping is that of 'goffering,' or 'gauffering,' by which the hollow form is given to petals, and the mid rib and veins of leaves imitated. For hollowing petals, the goffering-iron is simply a polished iron ball mounted on an iron wire in a handle. It is slightly warmed, and the petal is placed on a cushion, and the iron pressed against it. A variety of other forms of goffering-irons are used, such as prismatic rods, bent wires, etc. The venation of leaves is effected by dies, made of iron or copper, which are nevertheless called goffering irons.—The tinting of petals of the best flowers requires some delicacy and skill. In nature, however, the tint of each petal of a flower is rarely uniform; and the best artificial flowers represent the natural variations with great accuracy. The petals of a rose, for example, are dyed by holding each separately by pincers, and then dipping it in a bath of carmine, and afterward into pure water, to give delicacy of tint; but as the color is usually deepest in the centre, a little more dye is added there while the petal is still moist, and this diffuses itself outward in diminishing intensity. The whiteness at the insertion of the petal is produced by touching that part with pure water after the rest is dyed.

Leaves are cut and stamped in like manner from green taffeta, cambric, calico, etc. The glossy upper surface is represented by coating, with gum-arabic, the taffeta, etc., from which they are stamped, and the soft tone of the under side is obtained by means of starch colored to the requisite shade and brushed on when of the right consistence to dry with the proper effect. A velvety texture is given by dusting the powdered nap of cloth, which has been previously dyed of the required color, over the gummed leaf, the gum having been allowed to partly dry till it has become 'tacky.' The superfluous portion of nap is then shaken off. Buds are made of taffeta, tinted, and stiffened, and stuffed with cotton. Stamens are made of short pieces of sewing-silk stiffened with gelatine, and, when dry, the ends are moistened with gum and dipped in flour colored yellow to represent the pollen. Fine wire is sometimes used for the filament of the stamen.—The flower is built up from the centre; the pistil and stamens are tied in a bunch to a piece of wire; the petals are arranged in order, and pasted; then the sepals of the calyx are pasted outside of these, and further secured by winding fine thread or silk round the lower parts. Other wires are inclosed with this thread, and form the stalk, which is bound round with green tissue-paper; and, at proper intervals, the leaves are inserted by means of fine

wires, to which they are bound, the ends of these wires being bound in and incorporated with the stalk, and concealed by the green paper.

Besides the flowers copied from nature, there is a considerable demand for what are called 'fancy flowers,' most of which are invented by the manufacturer to use up waste and spoiled fragments originally designed for better purposes.—Flowers suitable for mourning are prepared by coating leaves, flowers, etc., with strong gum, and then dusting upon them powdered galena. This substance, a sulphuret of lead, is formed naturally in lustrous cubic crystals of a dark gray color, and, however finely it is powdered, the fragments still tend to retain the same shape and surface, and thus present a number of flat, glittering faces. It is used in like manner for cheap jewelry.

FLOWN, v. *flōn:* pp. of Fly, which see.

FLOX ÆRIS, *flŏks ē'rĭs:* term applied to the suboxide or red oxide of copper.

FLOYD, John Buchanan: 1807, June 1—1863, Aug. 26; b. Blacksburg, Va.: lawyer. He graduated at the College of S. C. 1826, studied law and was admitted to the bar, practiced in Helena, Ark. 1836–40, and then settled in Washington co., Va. He was a member of congress 1847–49, gov. of Va. 1850–53, and was sec. of war in Pres. Buchanan's cabinet from 1857. Mar., till the autumn of 1860, when he resigned. In 1861, he was indicted on charges of having scattered the army in remote parts of the country, having filled southern arsenals with arms and ammunition, and having been privy to the theft of $870,000 in govt. bonds from the interior department. He returned to Washington, demanded a trial, and was exonerated from each charge on investigation of a committee of the house of representatives. Soon afterward he was appointed brig.gen. in the Confederate army, served in Va. and Ky., and while senior officer at Fort Donelson abdicated his command, escaped with Gen. Pillow and 5,000 men at night, and threw the responsibility of surrendering to Gen. Grant upon Gen. S. B. Buckner. Two weeks afterwards he was relieved from command by President Davis.

FLOYD, William: 1734, Dec. 17—1821, Aug. 4; b. Brookhaven, N. Y.: signer of the Declaration of Independence. He was a farmer in early life, was delegate to the congress at Philadelphia 1774, deputy to the N. Y. provincial convention to select delegates to the continental congress and member of that body 1775, served in each congress till 1783, was state senator 1777–83 by appointment, and 1784–88 by election, was again member of congress 1789–91, was presidential elector 1792, 1800, 04, 20, and after the revolutionary war was maj.gen. of militia on Long Island.

FLUCTUATE, v. *flŭk'tū-āt* [L. *fluctŭātus,* moved like a

wave—from *fluctus*, a wave: It. *fluttuare;* F. *flotter*, to float]: to move, as a wave; to move, now in one direction, then in another; to be irresolute or wavering; to rise and fall, as prices. FLUC'TUATING, imp.: ADJ. unsteady; wavering; changeable. FLUC'TUATED, pp. FLUC'TUA'TION, n. *-ā'shŭn* [F.—L.]: a moving in this and that direction; a rising and falling suddenly.—SYN. of 'fluctuate': to waver; scruple; hesitate; vacillate; demur.

FLUDD, *flŭd*, ROBERT: 1574–1637; b. England; physician, best known as a mystical writer. After studying at Oxford, he became a devout student of the works of Paracelsus (q.v.). In numerous volumes he expounded a system of his own, in which a parallel was drawn between man the microcosm, and the universe around him, the macrocosm. The main physical principles were a northern or condensing power, and a southern or rarefying one; and there were four elemental spirits, corresponding to air, earth, water, and fire. So little established was physical science in that day, that this absurd system called forth refutations from men like Kepler. See De Quincey's works, vol. xvi.

FLUE, n. *flô* [OF. *flue*, a flowing: F. *fluer*, to flow: OF. *fleute*, a flute, a pipe—from L. *fluĕrĕ*, to flow]: a small chimney leading into a larger; a passage for conveying smoke and flame from a fire; a tube or shaft for conveying hot air, etc.: see CHIMNEY.

FLUE, n. *flô*, or FLUFF, n. *flŭf* [W. *pluf*, feathers: Bav. *flawen*, light dust that settles on clothes: Ger. *flaum*, down]: nap or down; little feathers or flocks that stick to clothes. FLUF'FY, a. *-fĭ*, pertaining to nap; soft and downy.

FLUENT, a. *flô'ĕnt* [L. *fluĕn'tem*, flowing—from *fluō*, I flow: It. *fluente*]: flowing smoothly; ready in speech; voluble. FLU'ENCY, n. *-ĕn-sĭ*, readiness of utterance; smoothness. FLU'ENTLY, ad. *-lĭ*, with ready flow. FLUENTS AND FLUXIONS, in *math.:* see FLUXIONS.

FLUFF, n. *flŭf* [Dan. *fnug*, down: AS. *flugol*, a fugitive (see FLUE 2)]: nap or light dust; feathery particles that float in the air; nap or down. FLUFFY, a. *flŭf'fĭ*, resembling fluff or nap; soft and downy. FLUFFIER, comp. *flŭf'fĭ-ėr*. FLUF'FIEST, superl.

FLÜ'GEL, JOHANN GOTTFRIED, *yō'hân gōt'frēd*, German lexicographer: b. Barby on the Elbe 1788, Nov. 22; d. Leipsic 1855, June 24. He spent many years in the United States prior to 1820 in business, diplomatic and official occupations, and became professor of English in the University of Leipsic in 1824. He compiled a *Complete English-German and German-English Dictionary* (1830), besides publishing *A Series of Commercial Letters* (9th ed. 1874); *Practical Handbook of English Business Correspondence* (9th ed. 1873) *Triglot; or Mercantile Dictionary in Three Tongues—German, English, French* (2d ed. 1854); and other useful manuals, all revised, or brought down to contemporary needs, by his son.

FLUGELMAN, n. *flô'gl-măn* [Ger. *flügelmann*, file-leader

—from *flügel*, a wing, *mann*, a man]: a soldier who stands on the right or in the front of a body of men, and whose motions in the manual exercises they simultaneously follow: also spelled FUGLEMAN, n. *fū'gl-măn*.

FLUGGEA, n. *flŭg'gĕ-a* [named by Willidenow after John *Flügge*, a German cryptogamic botanist]: a genus of *Euphorbiaceæ*. The bark of *F. virosus* intoxicates fish. The berries of *F. leucopyrus*, an Indian, and *F. abyssinica*, an Abyssinian species, are eaten by the natives.

FLUID, n. *flō'ĭd* [F. *fluide*—from L. *fluĭdus*, flowing—from *fluō*, I flow: It. *fluido*]: a liquid or a gas: anything that flows like water. The mathematical definition of a fluid is, that it is a collection of material particles which can be moved among each other by an indefinitely small force. No fluid in nature strictly fulfils this definition, though very many do so sufficiently nearly to make the conclusions founded on the definition practically correct. Fluids are distinguished into *Elastic* and *Inelastic*—the former being those the volume of which is diminished by pressure, and increases when pressure is removed, e.g., vapors and gases; the latter being those which have not this property, e.g., water and all those fluids termed Liquids (q.v.). Elastic fluids are spoken of also as compressible; and inelastic as incompressible—which, strictly speaking, no known fluid is, though all ordinary liquids are sufficiently nearly so to be so regarded without sensible error. See VAPOR: ELASTICITY: HEAT: COHESION: CAPILLARY ACTION. FLUID, a. movable or flowing, as water or air. FLUID'ITY, n. *-ĭd'ĭ-tĭ*, or FLU'IDNESS. n. [F. *fluidité*]: the state in which bodies tend to flow, or are capable of flowing; a liquid state.

FLUKAN, n.: see under FLOOKEN.

FLUKE, n. *flōk* [Ger. *pflug*. a plow (see FLOOK)]: the broad part of the arm of the anchor (q.v.), whose pointed triangular termination fastens in the ground.

FLUKE, v. *flōk* [probably originating as a slang term at billiards (see FLUKE 3)]: to play for one thing and get another; to come in for an unexpected stroke of luck; to succeed unexpectedly and undeservedly: N. a haphazard; a mere chance; a stroke of good luck; an unexpected advantage. FLUK'ING, imp. FLUKED, pp. *flōkt*.

FLUKE, n. *flōk* [AS. *floc*, a fluke: Icel. *floki*, a kind of halibut]: a fish called a flounder. FLUKE, or FLUKE-WORM (*Distoma hepaticum*), an entozoon common in the liver and biliary ducts of ruminants, particularly of sheep, in which it produces the disease called *Rot*, often causing great mortality in flocks during wet seasons and on ill-drained lands. It receives its common name from its resemblance in form to the flounder, of which *fluke* is a Scotch and old English name. For a similar reason it is sometimes called *Plaice*. It is a Trematode (q.v.) worm, higher in organization than the cestoid worms, but not so high as the *Cœlemintha*. It is generally not quite an inch in length, often much less, sometimes more; of oval form, its breadth

about half its length; flat, in color not very different from the liver in which it exists; it has no eyes nor other known organs of special sense; it is hermaphrodite, and the organs of reproduction occupy great part of its body, the ovaries being ranged along the margin; its anterior extremity is furnished with a sucker, and another is situated at a small distance on the ventral surface, whence the name *Distoma* (Gr., two-mouthed), but the terminal sucker alone is perforated and serves as a mouth, by which bile—the food of the creature—is imbibed; the tube which proceeds from it not, however, becoming a proper intestinal canal, but soon dividing into two large branches, and ending in minute ramifications in all parts of the body. Prodigious numbers of flukes of different sizes are sometimes found in the liver of a single sheep, but they are now believed not to multiply there, as was formerly supposed. Their eggs, indeed, are produced there in great quantity, but find their way into the outer world to begin a series of transformations not yet accurately traced with regard to this particular species, but of which the general nature is known. It seems that the young flukes, having entered as *Cercariæ* into the bodies of mollusks or of aquatic insect larvæ, are conveyed into the stomachs of ruminants feeding on herbage to which these are attached, and, finding their way to the liver, there attain their full development.

Instances have occurred of the presence of *Distoma hepaticum* in the human liver and *vena portæ;* as well as of a similar species, *D. lanccolatum;* a small species of the same genus, *D. heterophyes*, has been found in great numbers in the human intestines in Egypt, but its influence on the system is unknown; a species of much elongated form, *D. hæmatobium*, is very common in Egypt, infesting the *vena portæ* of man, and the walls of the urinary bladder, and producing local, and afterward general disease; a small species, *D. ophthalmobium*, has been found in the human eye, but probably through some such accident as in another case has led to the occurrence of the common fluke under the skin of the foot, where it caused a sore. Of all the known species, the Egyptian, *D. hæmatobium*, is by far the most hurtful, as infesting the human body. This species is also remarkable different from the others, in not being hermaphrodite, and in the extreme dissimilarity of the male and female; the female being a thread-like worm, for which a lodgment is provided in a furrow (*gynæcophorus*) on the central surface of the male. It is frequently known as *Bilharzia*.—The genus *Distoma*, or Fluke, contains a great number of species, infesting, in their mature state, different kinds of animals, and finding their appropriate place in very different parts of the animal frame. The wrinkled membrane around the eyes of birds is the place of some.

FLUME, n. *flôm* [Norw. *flaum*, a flood: OF. and AS. *flum;* L. *flūmĕn*, a river]: a stream of water in a confined channel to drive a mill; an artificial stream of water in gold-washing: applied also to similar streams of water flowing naturally between rocky walls, notable among which is

The Flume in the Franconian Mountains, N. H., 16 m. from Littleton.

FLUMMERY, n. *flŭm'mėr-ĭ* [W. *llymru*, an acid preparation from the husks and fragments of oats; or Ger. *pflaumerei*—from *pflaum*, a plum]: a kind of food made from the husks of oats steeped in water, called in Scotland *sowens;* a light kind of food; empty compliment; mere flattery.

FLUNG: pt. and pp. of the verb FLING.

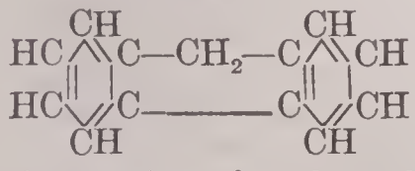
FLUNK, n. *flŭngk* [colloq.—etym. doubtful]: a lazy lounging fellow; a failure in or backing out of any undertaking: V. to fail, as in a lesson; to retire through fear; to back out.

FLUNKY, or FLUNKEY, n. *flŭng'kĭ* [Low Ger. *flunkern*, to be gaudily dressed: Dut. *flonkeren*, to glitter]: a servant in livery, usually a term of contempt; one who is obsequious and cringing to persons of rank, and a servile imitator of their manners; an upstart; a low mean-spirited fellow. FLUN'KYISM, n. *-kĭ-ĭzm*, the character or quality of a flunky. FLUN'KYDOM, n. the place or domain of flunkies. *Note*—Skeat says FLUNKY is derived from F. *flanquer*, to flank—as being one who supports, or is at one's elbow for help at need; a henchman.

FLUOR, n. *flō'ŏr* [F. *fluor*, fluorine—from L. *flŭō*, I flow; *flŭŏr*, a flowing—so called from being used as a flux]: mineral called usually FLUOR SPAR and FLUORITE. It is a fluoride of calcium Ca F_2 and occurs both crystallized and massive. It crystallizes in the isometric system with cubical habit. Its hardness is 4 and its specific gravity varies from 3.00 to 3.25. The color varies from white through yellow, green, red, blue, and brown. The green and violet-blue varieties are most common, and the red is rare. Different shades of color frequently appear in the same specimen, and, in the massive varieties, beautifully intermixed.

Fluor has a vitreous lustre, and certain specimens exhibit a bluish fluorescence (q.v.). The mineral develops differences of electrical potential under the influence of heat and of light. Fluorite occurs in England, Germany, and many parts of the United States, and the commercial supply comes chiefly from Kentucky, Illinois, Arizona, Tennessee, and New Hampshire. It is a chief source of fluorine and hydrofluoric acid (see FLUORINE), and is also used as a flux for promoting the fusion of certain refractory minerals, deriving its name from this latter circumstance (Latin, *fluor*, a flow).

FLUORENE: also termed diphenylenemethane.



is a hydrocarbon contained in the portion of coal-tar boiling at 300°–305° C. It crystallizes in colorless plates, melts at 113° C. and boils at

295° C. Fluorene can be prepared artificially in several ways and is of interest and importance because of its chemical relationship to a number of dyes of considerable technical value.

FLUORESCEIN: also termed resorcinolphthalein, $C_6H_4\left\langle\begin{matrix}C\\CO\end{matrix}\right\rangle O<\begin{matrix}C_6H_3(OH)\\C_6H_3(OH)\end{matrix}>O + H_2O$, is a dark red powder which decomposes at about 290° C. It is prepared by heating phthalic anhydride, $C_6H_4<\begin{matrix}CO\\CO\end{matrix}>O$, with resorcinol (metadihydroxybenzene), $C_6H_4(OH)_2$. Fluorescein is interesting not only because of its close relation to *phenolphthalein* and to the *phthalein dyes* (q.v.), but also because of its intense *fluorescence* (q.v.) In alcohol it dissolves with a yellowish red color and a green fluorescence; in concentrated alkali the color is dark red and this changes, on dilution, to yellow and the liquid develops a magnificent yellowish green fluorescence. On account of these properties fluorescein has been used to determine the course of underground streams, because the fluorescence is visible at very great dilutions. Fluorescein is sometimes employed to color soft drinks and various toilet liquids. It has, of course, no value as a food or medicinal agent.

FLUORESCENCE, *flô-ŏr-ĕs′ĕns:* that property of certain bodies in virtue of which they become self-luminous when exposed to light of certain wave-lengths. All bodies reflect a part of the incident light, but fluorescence is more than a mere reflection, as may best be shown by an example. 'Canary glass' (glass colored slightly with oxid of uranium) exhibits a beautiful yellowish-green surface color when well illuminated, and for this reason it is much used for the production of ornamental effects. If a ray of sunlight be admitted into a darkened room through a piece of cobalt glass that is so dense that the feeble violet light that it transmits is barely visible, the canary glass shows its yellow-green color brilliantly when placed in its path. This shows that the phenomenon is not simple reflection, and further evidence of the same sort may easily be had. Thus it is evident that a fluorescent substance absorbs a portion of the light that strikes it, modifies it profoundly in some manner, and then radiates it again. It has been shown that the modification consists in increasing the wave length of the incident light; and it is now known that fluorescent light invariably has a greater wave-length than the primary light that excites the fluorescence.

Many substances exhibit F. to a greater or lesser degree. An aqueous infusion of horse-chestnut bark shows it brilliantly, and so also does a solution of sulphate of quinine. Certain of the coal-tar colors (q.v.), are conspicuously fluorescent, fluorescein taking its name from this fact. Kerosene is fluorescent, and sometimes strongly so. Most fluorescent substances cease to emit light almost instantaneously when the incident light is cut off from them.

Some, however, such as calcium tungstate and the sulphids of calcium, barium, and strontium, continue to emit their rays for a sensible time, fading gradually away into darkness after the incident light ceases to excite them. It is to be observed that F. differs from phosphorescence (q.v.) not only because it is usually of very short duration, but primarily because it is induced by the exciting action of light-rays. Phosphorescence may be due to very different causes. The light emitted by phosphorus, for example, is probably due to the slow oxidation of that substance. That which is observed in the ocean at night, and in connection with various fungi and insects, is due to causes which are more or less obscure; but in any event these various phosphorescent phenomena are quite different from true F.

FLUORHYDRIC ACID. See HYDROFLUORIC ACID.

FLUORIDES, *flō′ŏr-īdz:* compounds of fluorine (q.v.) and a metal. Many of the metallic elements take fire when immersed in fluorine, and burn with the formation of the corresponding fluorides. Fluorides are also formed by the action of hydrofluoric acid (q.v.) on aqueous solutions. In nature the minerals cryolite (q.v.) and fluor (q.v.) are fluorides.

FLUORINE, *flō′ō-rĭn,* a gaseous, non-metallic element, possessing properties resembling those of chlorine, and exhibiting powerful chemical affinity. It occurs abundantly in nature, notably in the minerals fluorite and cryolite, from the former of which it takes its name. The elementary character of fluorine was first recognized by Ampère and Davy about 1810; but although many attempts were made to isolate it, none was certainly successful until 1887, when Moissan succeeded in preparing it in the elementary state by electrolyzing a solution of hydrogen potassium fluoride, HF,KF. When thus prepared fluorine is a gas, variously described as colorless, or as of a light greenish-yellow color. Many of the elements take fire when immersed in it, and burn with the formation of the corresponding fluorides. Water is decomposed by it, with the formation of hydrofluoric acid, HF, and the liberation of ozonized oxygen; and in fact fluorine appears to combine with all known elements except oxygen and carbon, and argon, helium, and the other recently discovered inert gases of the atmosphere. Fluorine has the chemical symbol F, is a monad, and has an atomic weight of about 19. Few of the physical properties of the element are yet known, on account of the difficulty of handling it. It corrodes glass rapidly, for example, and for this reason glass vessels cannot be used in experimenting with it.

FLURRY, n. *flŭr′rĭ* [a corruption of FLUSTER or FLUTTER, which see]: bustle; violent agitation; commotion: V. to bustle greatly; to put in agitation. FLUR′RYING, imp. FLUR′RIED, pp. *-rĭd,* agitated; alarmed.

FLUSH, v. *flŭsh* [Dut. *fluysen,* to flow with violence, to rush: Scot. *flusch,* a run of water: Norw. *flust,* abundantly;

flus, open handed; imitative of the sound of flowing water]; to redden suddenly; to glow; to blush; to cause redness; to elate; to flow suddenly; to flood or inundate with water: N. sudden glow; redness of the face from an afflux of blood; a sudden flow of water; ADJ. fresh; full of vigor; abounding; even or level with, as the water of a river with its banks in time of flood: said of a deck of a vessel when it extends without break on one level from bow to stern; but 'flush-decked ships of war' technically are such as have all their guns on the upper deck: AD. so as to be even or level with. FLUSH'ING, imp.: N. a flowing of blood into the face; a glow of red in the face. FLUSHED, pp. *flŭsht.* FLUSH'NESS, n. abundance. FLUSH OF MONEY, having abundance of money. *Note.*—FLUSH, to redden, appears to be a different word from FLUSH, to flow suddenly, and may be derived from such a form as prov. Sw. *flossa*, to blaze, and be connected with FLARE, but the senses have become confused—see Skeat.

FLUSH, a. ad. *flŭsh* [Sp. *flux*, cards of a suit]: in *card playing*, all of a suit, as, 'I am *flush*,' '*flush* hand.'

FLUSHING, *flŭsh'ĭng:* village of Queens co., N. Y.; on Flushing Bay and the Flushing and North Side, and the Long Island railroads; 7 m. from New York, and directly connected with it by a line of steam ferryboats. Flushing is one of the oldest nursery centres in the country, and for more than two centuries has been noted for its elegant trees and the care bestowed on them. Almost every avenue is planted with a single kind; one is a veritable arboretum, having on each side one of a pair of nearly every variety in ordinary cultivation, and some rare ones. Flushing contains numerous churches, and Sunday schools, church property valued at $100,000, public high school that cost $65,000, several grammar and primary schools, Flushing Institute (1828), St. Joseph's Acad., St. Mary's Seminary, St. Michael's School, gas and Holly water-works (cost $200,000), town hall, branch of the New York Infant Asylum, private retreat for the insane, beautiful park, a soldiers' monument, state bank, and savings bank. Flushing was settled by Quakers prior to 1662. Its chief industries are gardening, nursery business, and fruit raising; became part of New York city, 1898.

FLUSHING, *flŭsh'ĭng* (Dutch *Vlissingen*): strong fortress and seaport of the Netherlands, province of Zealand, on the s. coast of the island of Walcheren, on the n. shore of the mouth of the Western Scheldt; lat. 51° 26′ n., and long. 3° 36′ e. It was formerly an important naval station of the Netherlands, and had extensive dockyards and arsenals. The harbor can receive large sea-going vessels, and considerable trade is carried on with England, India, and other countries. A railway through Zealand to join the main continental lines has its terminus station close to the harbor, and there is daily service by superior steamers between Flushing and Queensborough, on the London Chatham and Dover railway. Flushing is strongly fortified, and com-

mands the entrance of the Scheldt. It is the birthplace of Admiral de Ruyter. It was stormed and taken by the English in the Walcheren expedition under Lord Chatham 1809. Pop. about 15,000.

FLUSTER, v. *flŭs'tėr* [Icel. *flaustr*, over haste: Wal. *flusturá*, to raise a wind: allied to *bluster*]: to agitate; to confuse; to be in a heat or bustle: N. hurry; bustle; confusion; disorder. FLUS'TERING, imp.: ADJ. bustling; flurrying. FLUS'TERED, pp. *-tėrd:* ADJ. confused; tipsy.

FLUSTRA, *flŭs'tra:* genus of zoophytes, of the class *Polyzoa* (or *Bryozoa*), and order *Cheilostomata*. The name is said to have been derived by Linnæus from the Saxon *flustrian*, to weave, because of the mat-like structure of the polypidoms, which in this genus are extremely plant-like, and by unscientific observers are generally regarded as belonging to the vegetable, and not to the animal kingdom. In some species the polypidom assumes the appearance of a branching frond, with polyp cells either on one side only, or on both sides; in others, it extends as an incrustation on rocks, shells, sea-weeds, etc. The polyp cells are arranged quincuncially, and are in juxtaposition, more or less quadrangular, flat, and with a distinct border, which is sometimes furnished with teeth of short spines. The polyps have the power of moving either the whole head at once, or the tentacles separately, and show no little activity, so that a living Flustra, seen through a magnifying-glass, is a most beautiful and interesting object. A common British species is *F. foliacea*, which grows on hard ground in a few fathoms' water, and is continually found torn up by the waves, and scattered on the shore. The same species occurs in the Pacific Ocean. A single sq. inch of *F. carbasea*, another common British species, has been found to contain 1,800 cells; and as there are about ten sq. inches in an average polypidom, a single specimen may ordinarily contain about 18,000 polyp heads.

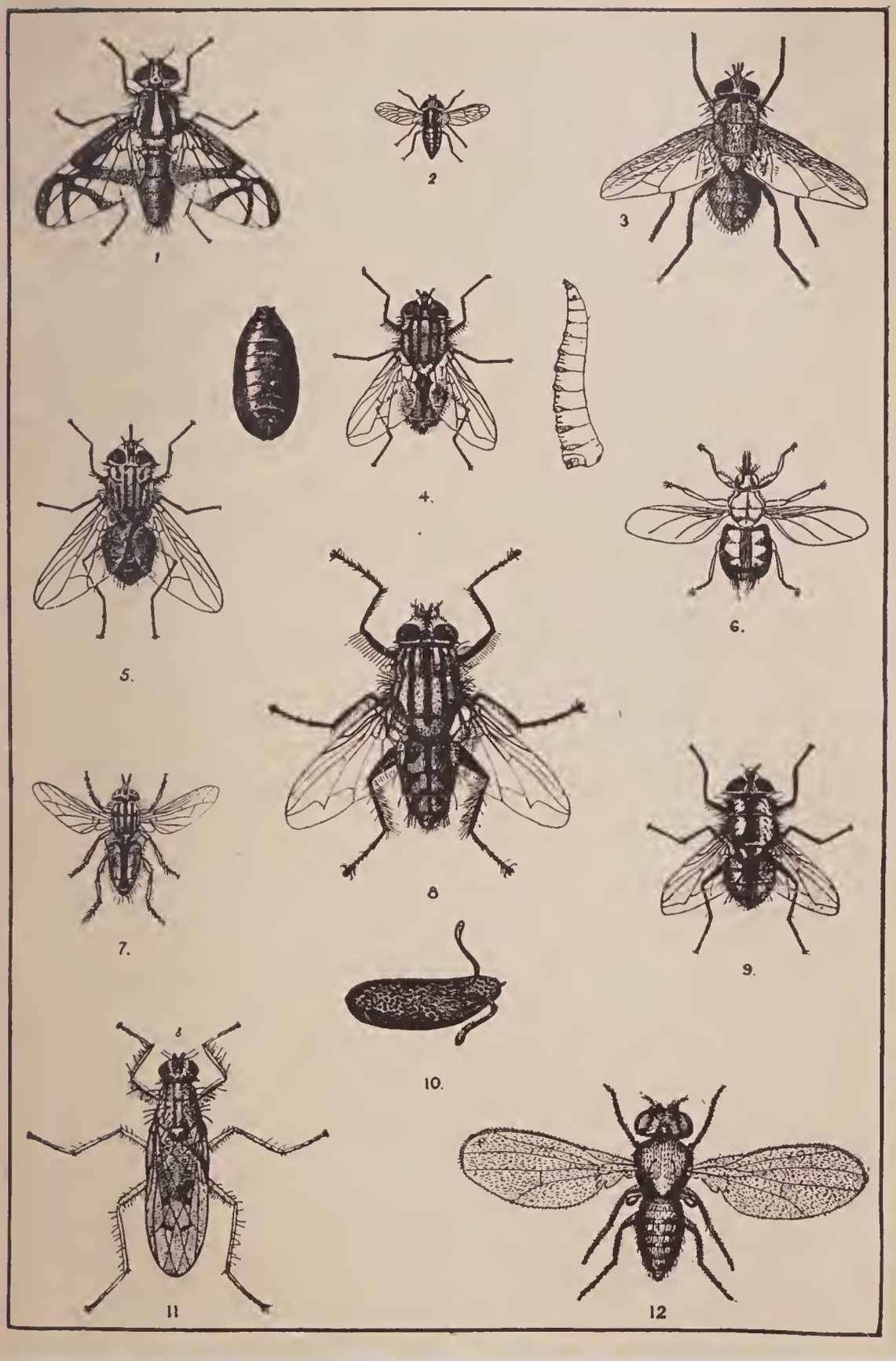
FLUTE, n. *flôt* [F. *flute;* OF. *flaüte*, a flute—from *flaüter*, to blow into a wind instrument—from It. *flauto*, a flute—from L. *flātŭs*, blowing, breathing: Ger. *flöte*, a flute]: one of the oldest wind instruments, well known to the ancient Greeks, with a soft and pleasant quality of tone. It is an important instrument in orchestral music, and, in consequence of its easy treatment, is much in favor with amateurs. The flute is commonly of boxwood or ebony, sometimes of ivory or silver. Its form is that of a taper tube, made in four pieces, with six holes for the fingers, and with from one to fourteen keys, which cover or open other holes. The sound is produced by blowing from the mouth into the embouchure, an oval kind of hole at one side of the thick end, which is done by the lips covering a part of the hole, so that the air in its passage from the mouth is broken against the opposite edge of the hole, which causes the column of air inside the tube to vibrate. The notes of the gamut are produced by the opening or shutting of the holes by the fingers of both hands. The compass of the flute is from D to A sharp, 19 diatonic intervals. For solo-play-

ing, a flute with a compass from G to C is sometimes used. For orchestral purposes, there are also the *tierce* flute, the octave flute, the E flat and F piccolo flute; and the highest of all the C piccolo. FLUTE, v. to channel or furrow, as if with pipes. FLU'TING, imp.: N. in *arch.*, moldings in the form of hollows or channels cut vertically on the surface of columns. These were adopted by the Greeks as ornaments to their Doric, Ionic, and Corinthian columns, and were retained by the Romans. The Tuscan is the only style without flutes. In Doric, there are 20 flutes on the circumference, and the curves meet with a sharp edge. These curves are supposed, in Greek Doric, to be elliptical, and they are carried up across the necking to the base of the cap. In the other styles, there are 24 flutes on the circumference. These are semicircular, and are separated by a small fillet; and, before reaching the necking and the base, are terminated with semicircular top and bottom. Flutes are said to be called when they are filled in to about one-third of their height from the base with a convex bead. This is to strengthen the column and protect the flutes. In countries where Roman remains were abundant, as in s. France, fluting was sometime adopted by the early mediæval architects, as at Arles and Autun. In Italy also, traces of this decoration are visible during the middle ages; but the flutes soon ceased to be vertical, and, in Romanesque Architecture (q.v.), assumed many varieties of forms, such as curves, zigzags, etc., twisting round the shafts.—In *laundry*, fluting is an ironing of starched articles into grooves like flutings on a column. FLU'TED, pp. channelled or furrowed, appearing like a flute cut in two. FLU'TER, n., or FLU'TIST, n. one who plays on a flute—also FLAUTIST, which see. FLUTE-WORK, class of stops in organ-building, so termed in distinction from *reed-work*. There are also numerous stops in German organs, specially designated with the names of flutes of different kinds, of eight ft. and four ft. pitch, some of which have of late years been introduced into English and American organs.

FLUTTER, v. *flŭt'tėr* [Low Ger. *fluttern;* Ger. *flattern*, to make a flapping or flutter: Dut. *fledderen*, to flap the wings; imitation of a flapping noise]: to move or flap the wings rapidly or irregularly; to hover; to drive in disorder as frightened birds; to move about quickly and nervously; to be in agitation: N. vibration; quick and irregular motion; hurry; agitation of the mind; disorder. FLUT'TERING, imp.: N. act of hovering or flapping the wings without flying; agitation: ADJ. flapping the wings without flight. FLUT'TERED, pp. *-tėrd.* FLUT'TERINGLY, ad. *-lĭ.*

FLUVIAL, a. *flō'vĭ-ăl*, or FLU'VIATILE a. *-ă-tĭl* [F. *fluvial*—from L. *fluvĭālĭs*, pertaining to a river—from *fluvĭŭs*, a river: It. *fluviale*]: pertaining to a river, produced by river action; growing or living in fresh-water rivers. FLUVICOLI'NÆ, n. *-kō-lī'nē* [L. *colo*, I inhabit]: in *ornith.*, a sub-family of *Muscicapidæ*, or Fly-catchers, found in S. America; sometimes called *Alectrurinæ*. FLU'VIOMARINE',

HOUSE, STABLE AND GARDEN FLIES.



1. Apple-worm Fly. 2. Orange-belted Gadfly. 3. Horn-fly. 4. Common House-fly, with Maggot and Puparium. 5. Stable-fly. 6. Forest-fly or Bird-tick. 7. Meat-fly. 8. American Flesh-fly. 9. Green-bottle Flesh-fly. 10. Egg of Pomace-fly. 11. Dung-fly. 12. Pomace-fly.

a. *-ō-mă-rēn′* [L. *mărĕ*, the sea]: in *geol.*, applied to stratified deposits having a mixed river and sea origin; estuarine.

FLUX, MAGNETIC. See MAGNETISM.

FLUX, n. *flŭks* [L. *flŭxŭs*, a flow—from *fluō*, I flow: It. *flusso:* F. *flux*]: any flow or issue of matter; matter discharged; fusion; a moving or passing in continued succession. In *med.*, a discharge generally from a mucous membrane. The term is applied to all preternatural fluid evacuations from the body, but especially to those from the bowels, and from the uterine organs. Dysentery (q.v.) was long termed the bloody flux, to distinguish it from simple diarrhea. Another scientific term for flux is Profluvium, which gives the name to a large order of diseases in Cullen's *Nosology*. See also CATARRH: MENSTRUATION: and, with respect to etymology only, RHEUMATISM. In *metallurgy*, substance added in the smelting of metals to promote their fusion. In the large way, limestone, and fluor-spar are used as fluxes. In the smelting of iron great attention has to be paid to the fluxes, because on their character depends to some extent the complete separation of the metal. To accomplish this the flux must be such that it will combine with the earthy matter of the ore, and form a slag, which must neither be too refractory nor fusible. Hence if the ore abound in clay or sulphur, lime, or limestone, and possibly sand, must be added; if in quartz, lime and clay are requisite, otherwise the quartz is slagged by combining with part of the iron, which is thus lost. Frequently ores are so selected that the earthy matters present may flux each other, but this requires skill and experience. The fluxes used in pottery are very various, and are distinguished by different names; but they almost all consist of litharge or red-lead, with sand or boracic acid, sometimes singly, sometimes together. They are, therefore, essentially colorless glasses used as vehicles for infusible colors. See IRON: COPPER: etc. FLUX, a. inconstant; not durable: V. to melt; to cause a flux or evacuation. FLUX′ING, imp. FLUXED, pp. *flŭkst.* FLUXIBLE, a. *flŭks′-ĭ-bl*, capable of being melted or fused. FLUXIBILITY, n. *-bĭl′-ĭ-tĭ*, the quality of being fluxible. FLUXION, n. *flŭk′shŭn* [F. —L.]: act of flowing; the matter which flows. FLUX′IONS, n. plu. branch of mathematics (see below). FLUX′IONAL, a., or FLUX′IONARY, a. *-ĕr-ĭ*, pertaining to fluxions. FLUX′IVE, a. *flŭks′ĭv.* in *OE.*, flowing with tears.

FLUXIONS, in Mathematics: the name given by Newton to his method of developing what is now called the Differential Calculus. It is essentially identical with the method of *rates*, which is still found in many textbooks. Newton associated with every varying quantity the idea of velocity, derived from the motion of a point. If two such quantities x and y are connected by a relation $y = f(x)$, it is required to find the relation between their velocities or rates of change. These latter Newton denoted by $\dot{x}$ and $\dot{y}$. The quantities x and y, which in modern language we call variables, he called *flowing* quantities or

fluents; and x', y', which are our dx/dt, dy/dt, he called the *fluxions* of x and y. In modern notation $dy=f'(x)dx$, where Newton wrote $\dot{y}=f'(x)x$. The fluxions of $\dot{x}$, $\dot{y}$ are denoted by $\ddot{x}$, $\ddot{y}$, but it is commonly assumed that the velocity of x is uniform so that $\dot{x}$ is constant and $\ddot{x}=0$. Thus if $y=x^n$, $\dot{y}=nx^{n-1}\dot{x}$, $\ddot{y}=n(n-1)x^{n-2}\dot{x}^2$, in close conformity to modern notation, which simply rejects the denominator dt. The notation $\dot{x},\dot{y},\ddot{x}$, . . . is still frequently used in English mathematical works to represent actual velocities dx/dt, ... For fluents, our *integrals*, Newton had no special symbol. Thus for $\int x^n dx$ he wrote $\overline{|nx^{n-1}.\dot{x}|}$, putting the integrand in an enclosure. Our differential notation is due to Leibnitz, who also introduced the integral sign $\int$. Newton's *Methodus Fluxionum* was finished in 1671, but the paper was first published in 1736 after his death. See CALCULUS.

FLY, n. *flī* [AS. *fleoga;* Icel. *fluga*, a flying insect (see next FLY)]: popular name for insects of the order *Diptera* (q.v.) generally; sometimes extended to insects of other orders, sometimes limited to the *Muscides* (q.v.). It is often used with a prefix, as house-fly, blow-fly, etc., to designate particular kinds of insects. FLIES, plu. *Fly* denotes also something light or swift; a light carriage let on hire. FLY-BLOW, v. *-blō*, to taint with the eggs of a fly, which produces maggots, or by its droppings: N. the egg of a fly. FLY-BLOWN, a. tainted with maggots. FLY-POWDER, name of various compounds for killing flies; one kind used in Europe is a poisonous compound of metallic arsenic and arsenious acid, obtained by the partial oxidation of the metal on exposure to air. FLY-TRAP (see DIONÆA).

FLY, v. *flī* [Ger. *fliegen;* Icel. *fliuga;* Dan. *flyve*, to fly]: to move through the air on wings as a bird or insect; to pass on or away swiftly; to run or retreat rapidly, as an army; to move with great speed; to cause to rise with air; to break or part suddenly; to rush at or attack suddenly; to shun; to avoid. FLYING, imp. *flī'ĭng:* ADJ. floating; waving; light, and suited for prompt and rapid motion. N. act of moving in the air (see below). FLI'ER, n. one who or that which. FLEW, pt. *flô*, did fly. FLOWN, pp. *flōn*, moved through the air; passed away. FLY'ERS, n. plu. a flight of stairs that do not wind. FLY'AGARIC, *-a-găr'ĭk*, in *bot.*, *Agaricus muscarius*, a scarlet fungal covered with white or yellow warts. It grows in birch woods and is used to poison flies. FLY-BOAT, a swift boat used on canals. FLYING-BRIDGE, temporary contrivance to enable an army rapidly to cross a river (see PONTOON: FERRY). FLYING-BUTTRESS, in *arch.*, a curved brace or half arch for strengthening the part of a building which rises considerably above the rest. FLYING FOX (see KALONG: see also FLYING LEMUR). FLY-LEAF, the blank leaf at the beginning and end of a book. TO FLY IN THE FACE, to act in defiance; to insult. TO LET FLY, to discharge. TO COME OFF WITH FLYING COLORS, to be successful or triumphant. TO FLY OPEN, to open suddenly or

FLYCATCHERS.

1. Spotted Flycatcher. 2. Pied Flycatcher. 3. White-collared and Red-breasted Flycatchers. 4. Kingbird. 5. Bienteveo.

with violence. To FLY OUT, to rush out; to burst into a passion.

FLY-BLISTER, a collection of blood-serum between the layers of the skin, caused by the application of some preparation of the Spanish fly. It is used to extract fluid from underlying tissues, and to cause desired changes in local circulation. Absorption from applications sometimes takes place, giving rise to the irritation and inflammation of the kidneys, bladder and genital organs which characterize the drug when taken internally.

FLY-CASTING, the art of throwing an artificial fly in angling. (For the various methods employed see ANGLING.) Aside from its use in actual fishing the art is employed by some in competitive contests, and 'national tournaments' are held annually in both Great Britain and the United States, sustained by a federation of clubs devoted to the sport, in which the championship and prizes are competed for.

FLY'-CATCH'ER (*Muscicapa*): genus of birds of the order *Insessores*, tribe *Dentirostres*, family *Muscicapidæ*, having a moderately long angular bill, broad and depressed at the base, compressed and slightly curved at the point; the base surrounded with hairs or bristles directed forward, and which help to secure insect prey. The legs and feet are small; the outer toe the longest and attached to the middle one as far as the first joint. The wings are not long; the first quill-feather is very short; the third is the longest. The birds of this genus, as now restricted, are confined to the old world, and mostly to the warmer parts of it. Of the numerous American birds often called fly-catchers, some belong to nearly allied genera, and others to genera not now ranked even in the same family. The true fly-catchers all have the same habit—characteristic of many of the *Muscicapidæ* besides this genus—of remaining perched for a long time in the same spot, leaving it only to make a sudden dart at a passing insect, which is seized with a snap of the bill, and then returning. They are almost never seen running on the ground, or even on the branches of trees, and do not chase insects in the air, like swallows. Only four species are European, two of which are British—the SPOTTED FLY-CATCHER (*M. grisola*) and the PIED FLY-CATCHER (*M. atricapilla* or *luctuosa*): birds about the size of a sparrow, the former of which is common in most parts of England, as a summer bird of passage: the latter is abundant in Europe. The spotted FLY-CATCHER is brownish gray above, white beneath, the head and breast marked with dusky spots. Its voice is a mere chirp. It is remarkable for its choice of situations for its nest, often on a beam in an out house, on the side of a fagot-stack, on the branch of a tree trained against a building, sometimes even on a lamp-post in a street. Mr. Durham Weir, of Boghead, a diligent observer of the habits of birds, mentions that he witnessed a single pair of spotted fly-catchers feed their young no fewer than

537 times in one day, and that their motions were so rapid that he could not keep his eyes off the nest for a moment.

The name Fly-catcher is often extended to other genera, and is sometimes used as co-extensive in signification with that of the family *Muscicapidæ*.

FLY'ING, or FLIGHT: locomotion of an animal in the air, by means of *wings*, organs specially adapted to that purpose. By means of these organs, the animal raises itself from the ground and sustains itself in the air, as well as moves forward in any direction. Birds and bats are the only existing vertebrate animals possessing the power of true flight; the lateral membranes of Flying Squirrels, Flying Lemurs, Flying Phalangers, and Flying Dragons, and probably even the great pectoral fins of Flying Fishes, serving only to sustain them in the air after the manner of a parachute, or at most to aid, on the principle of a boy's kite, in an oblique ascent. The extinct reptiles called Pterodactyles (q.v.) possessed, however, the power of true flight, as their remains sufficiently testify; and their wings were constructed on a plan as different from those both of birds and of bats as these (see BIRDS and BATS) are from each other. The wings in all vertebrate animals are the anterior limbs, and are thus homologous to the arms of man and the forelegs of ordinary quadrupeds; in birds, the bones answering to those of the hand are much abbreviated and consolidated; in bats, they are prodigiously elongated; in pterodactyles, there was an elongation of a single finger. Among birds, though the power of flight is general, there are exceptions to the rule, the wings of some being merely rudimentary, and at most helpful to them only in running, those of others being adapted to swimming, not on but under water.—The only invertebrate animals possessing the power of flight are insects; to the greater part of which vastly numerous class it belongs in their perfect state, though there are many insects quite destitute of it, and this is sometimes the case with species very closely allied to others which possess it; sometimes this great difference exists between the sexes of the same species. The wings of insects are not at all homologous to those of the flying vertebrata, though applied to the same use, and in structure are widely different from them all. See INSECTS.

In flying, the wings are made to beat or strike the air. The stroke in the one direction, however, must be very different from that in the other, or rather from that movement by which the wing is brought back to its place for another stroke. This difference is secured partly by greater force of muscular action, and consequent rapidity; the resistance of the air varying as the square of the velocity with which the wing moves in giving the stroke. But it is secured partly also by the conformation of the wing itself, the quill feathers of birds being so placed that they strike the air with their greatest extent of surface in the proper stroke of the wing, and *obliquely as it returns to its place*. An imitation of this is made in the rowing of a boat, and

is called *feathering the oar*. The wings of bats, consisting of a membrane extended upon jointed bones, are probably in part folded up in order to the return from every stroke; and this is perhaps the case with the wings of some insects; also, though those of others—as the Common Fly and the Bee—are certainly incapable of it; yet it is possible that even these may have a greater degree of rigidity communicated to them by the inflation of their air-tubes during the stroke than they have during the return.

Flying is analogous to swimming; but the difference of medium is very great, fresh water being about 800 times heavier than air, and the density of sea-water still greater. The bodies of animals intended for flight are therefore sometimes adapted to it partly by means which tend to diminish their proportionate weight, as the air-cavities in birds and insects; which, however, are still more important in relation to the increase of muscular power; and it is chiefly by the increase of muscular power that the power of flying is imparted. The exercise of strength requisite for swimming is comparatively small, about $\frac{1}{700}$ part only of that which is requisite for flying. How wonderful, then, the muscular powers of birds capable of long-sustained flight, far exceeding in rapidity the speed of the swiftest locomotive engine ever constructed by man! or of insects whose flight, in respect at least of rapidity, is in some species not inferior to that of the swiftest birds! The muscular power exerted in flying evidently differs very much both among birds and among insects. The large wings of some require much less frequent muscular action, either to sustain the body in the air, to elevate it, or to move it forward, than the comparatively small wings of others. The motion of the wings of humming birds and of insects is too rapid for the eye to follow.

It is not to be wondered at that projects of locomotion through the air have been much entertained by men, nor that, while the force of the objections above stated was unknown, artificial wings and an imitation of the flight of birds occupied the ingenuity of inventors. Grecian fable ascribes success to the mythic Dædalus (q.v.), who is said to have passed safely over the Ægean Sea on wings which he himself had made. More modern stories of similar success, though in far shorter flights, are numerous, but resolve themselves into exaggerated accounts of feats on ropes, or by some parachute-like contrivance. In the 13th or 14th c., Elmerus, a monk, is said to have flown more than a furlong from the top of a tower in Spain, but the distance is probably much exaggerated; and, in the 17th c., Besnier, a locksmith of Sable, in France, who prudently began from windows one story high, ventured at last, and safely, to leap from very elevated positions, and so passed over houses or over rivers of considerable breadth. Such feats encouraged the expectation of better results, cherished by some of the most scientific men of that period. Bishop Wilkins, in particular, gave much attention to this subject. Perceiving the inadequacy of the human arm.

and the muscles which move it, to give sufficiently rapid motion to wings of sufficient size, he suggests that 'it were therefore worth the inquiry to consider whether this might not be more probably effected by the labor of the feet, which are naturally more strong and indefatigable.' So confident was he of success, that he anticipated the time when a man should as readily call for his wings to make a journey, as he then did for his boots and his horse. More recently, in the end of the 18th and beginning of the 19th c., Sir George Caylay occupied himself with speculations and experiments on this subject. Acknowledging the difficulty which arises from the want of muscular strength in man, he says: 'It is only necessary to have a first mover which will generate more power, in proportion to its weight, than the animal system of muscles.' But this first mover has not hitherto been found. The employment of steam for this purpose has been frequently proposed. Attempts of this kind, however, have for their object aërial navigation, rather than artificial flying properly so called; though the inventions have been variously designated aërial ships, flying machines, etc. A great difficulty has been found in the weight of the steam-engine and its fuel; and expensive experiments have signally failed through miscalculation on this essential point. Frequently, attempts have been made to combine some modification of the balloon with the steam-engine or other means of propulsion. In no instance hitherto has there been the least approach to success, though a *European Aëronautical Society* was formed, and issued its advertisements 1835; and, about eight years afterward, an *Aërial Transit Company* not only amused the public for a considerable time, but obtained the assent of the British House of Commons to a bill for its constitution. Models have sometimes been exhibited of aërial machines capable of being guided at the pleasure of the aëronaut, in a perfectly still atmosphere, but nothing has yet been invented capable of serving any practical or useful purpose. There is, however, nothing evidently contrary to science or sound philosophy in proposals for aërial navigation, which, in this respect, differs widely from human or artificial flying.

The *aëronautic fish*, on which Marshal Ney is said to have spent 100,000 fr., for a considerable time occupied the attention of some of the most ingenious and scientific men in France. It was a large balloon, of a long fish-like figure, intended to swim in the air, as a fish in water, and to be propelled by wings or fins working by cranks. But when launched, though it floated and moved forward a little, it turned on one side, and this tendency could not be corrected; so that the experiment proved a complete failure. Consult: E. J. Marey, *Vol des Oiseaux* (Paris 1890); Prof. Chas. S. Roy, article *Flight*, in *Newton's Dictionary of Birds* (1896); Prof. S. P. Langley, *The Greatest Flying Creature*, Smithsonian Report 1901; Dr. Pettigrew *Animal Locomotion* and M. Marey, *Animal*

Mechanism (both in the *International Science Series*); and the controversy regarding theories of flight, in *Nature* (1874) and elsewhere. Recent progress in aërial navigation by means of airships and balloons is given in the articles AËRIAL NAVIGATION and BALLOON, where are also given extensive bibliographies. Consult also the files of *The Scientific American* and *The National Geographic Magazine* (1905–7)

FLY'ING DRAG'ON, or FLY'ING LIZ'ARD (*Draco*): genus of crassilingual lizards, allied to the iguanas and stellions, but remarkably distinguished from them, and indeed from all other reptiles now existing, by lateral membranes which support them in a parachute-like manner in the air, and enable them to pass from tree to tree, even to considerable distances. These membranes are supported on the first six false ribs, which, instead of encircling the abdomen, stand out at right angles from the body for this purpose. They are incapable of the movements requisite for true flying; when not in use, they are folded close to the body. There is also in the flying dragons an inflatable pouch under the chin, sustained partly by the hyoid bone and partly by two small bones. The tail is long. The scales are small and imbricated; those of the tail and limbs are keeled. The tongue is extensile, but not greatly so. All the species are small, live in trees, and feed on insects. They are natives of the E. Indies. The genus is subdivided by some naturalists.

FLY'ING DUTCH'MAN: in sailors' legends, a mariner who was compelled, as a penalty for his sins, to course the seas around the Cape of Storms unceasingly, without ever being able to reach a haven. Seamen who saw his black spectral ship on the horizon quickly changed their course and hastened to fly from his fatal influence. The notion that gave foundation to this legend is widespread in German mythology. The dead crossed the water in boats and ships, and northern heroes were sometimes buried in their ships, sometimes placed in a ship which was taken out to sea, and allowed to drift with the waves; and the same story is localized in the German Ocean, where Herr von Falkenberg is condemned to beat about the ocean until the day of judgment, on board a ship without helm or steersman, playing at dice for his soul with the Devil. The legend has been treated by Richard Wagner in his opera *Der fliegende Holländer*.

FLY'ING FISH: fish which has the pectoral fins so very large that by means of them it is sustained in short seeming flights in the air. Such fishes belong to two very different families—*Scomberesocidæ* and *Sclerogenidæ;* but the name flying fish is sometimes limited to those of the former family, the genus *Exocœtus;* those of the latter being known as *Flying Gurnards* (q.v.). The genus *Exocœtus* has the pectoral fins nearly as long as the body, the dorsal fin placed over the anal, the tail forked, and its

lower division considerably larger than the upper. It is subdivided by some naturalists into several genera, characterized by the presence or absence of barbels, etc. One species (*E. volitans*) is very abundant in the warmer parts of the Atlantic Ocean, the other (*E. exiliens*) is common in the Mediterranean. In the former, the ventral fins are far forward, and short; in the latter, they are far back, and considerably elongated. More than 30 species are known, all inhabiting the seas of the warmer parts of the world, and having their respective geographical limits well defined.

They swim in shoals; and whole shoals—varying in number from a dozen to a hundred or more—often leave the water at once, darting in the same direction through the air, and after descending into the water at a distance of 200 yards, or even more, from the place where they arose, quickly renew their flight. These flights of flying-fishes form one of the most interesting spectacles which relieve the monotony of a voyage in tropical seas. Sometimes, the coryphene (dolphin) may be seen in rapid pursuit, taking great leaps out of the water, and gaining upon his prey, which take shorter and shorter flights, vainly trying to escape their persistent foe, until they sink at last exhausted: sometimes the larger sea-birds catch flying fishes while they are in the air; but it does not seem to be at all true that these fishes leave the water, as has been very generally imagined, merely to escape from danger, nor is there any good reason for that sentimental pity which has been often expressed with regard to them, as creatures harassed and persecuted more than others, and peculiarly exposed to dangers both in the sea and in the air. They seem rather to exercise their powers, like other creatures, very often merely from the delight which they take in the exercise of them, and in an exuberance of activity. The question whether or not the flying fishes use their pectoral fins as wings is not completely decided; some observers maintain that they do, though of course the power of flight is limited to the time that the fins remain quite moist; but a great preponderance of testimony is in favor of the opposite opinion, which regards the fins as acting merely after the manner of a parachute or of a kite. Flying-fishes sometimes rise 20 ft. above the water, though they more frequently skim along nearer its surface. They often fall on the decks of ships. They are good food, and the natives of the South Sea Islands take them by means of small nets attached to light poles, like those in which anglers catch minnows for bait. For this purpose, they go out at night in canoes, to the outer edge of the coral reefs, with a torch, which enables them to see the fishes, and perhaps both attracts and dazzles them.

FLY'ING GUR'NARD (*Dactylopterus*): genus of fishes of the family *Sclerogenidæ* or Mailed Cheeks, nearly allied to the Gurnards (*Trigla*), but remarkably distinguished by the great size of the pectoral fins, which they use for the

same purpose and in the same way as the *Exocœti:* see FLYING FISH. The pectoral fins are, however, of very different appearance from those of the *Exocœti*, widening almost to the end, which is rounded, and the tips of the rays extending considerably beyond the membrane. A very long spine rises from the back of the head. One species (*D. volitans*) is common in the Mediterranean, and is sometimes 15 inches in length. Its flight is said not to extend to more than about 40 yards, but it sometimes rises high enough to fall on the decks of large ships. 'At particular times, especially on the approach of rough weather, in the night, numbers of them may be seen, by the phosphoric light which they emit, making their arched passages in apparent streams of fire.'—Another species inhabits the Indian seas. Some species of *Apistes*, belonging to the same family, have similarly large pectorals, and make similar flights.

FLY'ING LE'MUR, or COLU'GO (*Galeopithecus*): sometimes called also FLYING CAT and FLYING FOX, genus of mammalia, generally regarded as constituting a distinct family, *Galeopithecidæ*, which by some naturalists is placed, as by Cuvier, among the *Cheiroptera* (see BAT), though it is now more commonly associated with the Lemurs (q.v.), as by Linnæus. There are, indeed, evident affinities both to lemurs and bats, but chiefly to the former, with which the osteological and other anatomical characters generally agree. Along the sides extends an ample membrane or fold of the skin, beginning behind the throat, and including both the fore and hind legs as far as the toes, but leaving them free, and further stretched along both sides of the tail to the tip. In the last particular, it differs from the lateral membrane of the flying squirrels and flying phalangers, and more resembles that of bats; but it widely differs from that of bats in being comparatively thick, and covered on both sides with short thick hair; and still more in leaving the fore-feet free, and not being stretched on lengthened fingerbones. Nor can it be used for true flight, but only to support the animal in the air like a parachute, enabling it to take enormous leaps of abt. a hundred yards in an inclined plane. It is not yet determined whether the differences to be observed between the specimens of flying lemurs in collections, are to be regarded as differences of species or of variety. Attempts have been made to distinguish several species, but it is difficult on account of their great similarity. They are from 20 to 24 inches in total length, are natives of the Indian Archipelago, inhabiting lofty trees in dense forests, and feeding on small birds' eggs and fruits, as well as on insects. They are nocturnal in their habits. They are very inoffensive, and scarcely attempt to bite even when seized. Their voice resembles the low cackling of a goose. They produce generally two young ones at birth. The Pelew islanders greatly esteem them as food, but they have a rank unpleasant smell.

FLY'ING PHALAN'GER, or FLY'ING OPOS'SUM (*Pe-*

taurus): genus of marsupial quadrupeds, containing several species, natives of New Guinea and of Australia, where they are generally called Squirrels or Flying Squirrels. They are nearly allied to the Phalangers (q.v.), which they particularly resemble in dentition, but have not the tail so long and prehensile, while they are distinguished by a hairy membrane or fold of the skin extending along the flanks, and used as a parachute to enable them to leap to great distances. This membrane extends along both fore and hind legs almost to the toes, but does not appear behind the hind legs, nor include the tail, which is long and bushy, but which in some of them has a *distichous* character, the hair spreading out to the sides, and so rendering it useful in supporting as well as in guiding the body in the air. They are capable of modifying their course in the air, though not of true flight; and their aërial evolutions are very graceful. They repose during the day, and become active in the evening. They feed on fruits, leaves, insects, etc. A New Guinea species is about as large as a flying lemur; one of the Australian species is scarcely larger than a mouse. The fur of some of them is rich and beautiful. PETAURIST has been proposed as an English name for this genus; but it is not much used.

FLY'ING SQUID (*Ommastrephes*): genus of cephalopodous mollusks, allied to the Calamaries (q.v.) or squids, but differing from them in having the eyes exposed and not covered with skin, the fins united into one as a tail, and the *gladius* or bone furnished with three diverging ribs and a hollow conical appendage. The tail is large, and the power of locomotion great, so that these mollusks not only pass rapidly through the water, but leap out of it, and high enough sometimes to fall upon the decks of ships. They form a principal part of the food of many of the *Cetacea*, and are often the prey of albatrosses, petrels, and other marine birds. They are used as bait for cod in the Newfoundland fisheries.

FLY'ING SQUIR'REL (*Pteromys*): name given to a considerable number of species of the Squirrel family (*Sciuridæ*), which have a fold of the skin of the flanks extended between the fore and hind legs, and partly supported by bony processes of the feet, by means of which they are enabled to take extraordinary leaps, gliding for a great distance through the air. The tail also aids to support them in the air, as well as to direct their motion, its hairs extending laterally 'in a sort of feathery expansion.' The dentition is similar to that of true squirrels, with which also the habits generally correspond. One species (*P. Sibiricus*) is found in the north of Europe and of Asia; several species are natives of N. America, and others inhabit the s.e. of Asia and the Indian Archipelago. The European species is about the size of a rat, grayish-ash color above, white below, the tail only half the length of the body; it lives solitarily in the forests. Its fur is of

little value, but the skins are sometimes mixed with those of the gray squirrel, to impose on the purchaser. The most common N. American species (*P. volucella*), abundant from the Gulf of Mexico to Upper Canada, is fully five inches long, with a tail of five inches additional, fur included. It is of a brownish-gray color above, white beneath; a black line surrounds the orbit of each eye. All the species inhabit woods, and the night is their time of activity. They feed not only on nuts and young shoots of trees, but also on small birds. They are extremely easy of domestication, and are very playful and graceful.

In gliding from tree to tree, the common American flying squirrel descends obliquely and with very rapid motion until near the tree which it seeks to reach, when it wheels upward, and alights at about a third of the height which it was from the ground on the tree which it left, the distance between the trees being perhaps 50 feet.

FLY'-WHEEL: large heavy wheel applied to a steam-engine or other machinery in order to equalize the effect of the moving power. Its action depends on the principle, that a body once set in motion retains a certain amount of moving force or *momentum*. This increases with the weight of the body and the velocity of its motion, and may be expressed relatively by multiplying the weight by the velocity; or, stated otherwise, the force required to destroy the motion of a body is equal to that which sets it in motion. Thus, a heavy wheel becomes a sort of reservoir of force, when set in motion.

There are two principal cases in which the fly-wheel is commonly applied: first, when the motive power is intermittent or irregular; and second, when the resistance or work to be done is intermittent or irregular. The crank is a good example of the first case. If the force be applied only downward, as in the common foot-lathe, it will be intermittent, and the crank must rise independently of the prime mover. This is effected by applying a fly-wheel set in motion by the descending pressure of the foot acting on it through the crank; and the momentum it has thus acquired lifts the crank again to the point where it can be acted upon by the foot. It also carries the crank over the *dead points* (see CRANK), where even a double action of pulling and pressing would be ineffective. The case of a steam engine turning a long shaft which passes through several workshops, and, by means of bands, drives a number of lathes, punching, drilling, planing machines, etc., is a common example of the second case, the resistance, or work to be done, being very variable from one moment to another. In such work as that of a punching machine, the engine need not be nearly of sufficient power to directly force the punch through the metal, and yet, by the aid of the fly-wheel, it may do it; for, while the punch is rising, the engine is communicating momentum to the fly-wheel, and when the descending punch meets with the

resistance that it has to overcome, this reserved momentum is added to the direct power of the engine, the punch is forced through, and the speed of the fly-wheel slackened in proportion to the resistance. The principle of the fly-wheel is sometimes applied in other forms than that of a wheel, as in the hand coining-press, where a heavy ball is fixed at each end of a long lever, which is made to swing round with considerable velocity, and the accumulated momentum is concentrated upon the blow.

FO. See BUDDHA.

FOAL, n. *fōl* [Goth. *fula;* Icel. *foli;* Ger. *fohlen;* W. *ebol,* a young horse]: the young of the horse kind, or of an ass; a colt or filly: V. to bring forth young, used of the horse kind. FOAL'ING, imp. FOALED, pp. *fōld.*

FOAM, n. *fōm* [AS. *fam;* Ger. *faum;* Dut. *broem,* scum, foam]: the white substance formed on the surface of bodies of water by agitation, as the foam of the sea, or at a cataract; the substance formed on the surface of liquors by agitation or fermentation—*froth* is strictly applicable to smaller bodies of liquids: V. to throw out froth in a rage or in a fit; to be in a rage; to froth. FOAM'ING, imp.: ADJ. frothing; fuming. FOAMED, pp. *fōmd.* FOAM'INGLY, ad. *-lĭ.* FOAMY, a. *fōm'ĭ,* abounding in foam. FOAM'LESS, a.

FOB, n. *fŏb* [prov. Ger. *fuppe,* a pocket: Gael, *faob,* a projection, as made by the watch in the pocket]: a little pocket, as for a watch; a kind of watch-guard.

FOB, v. *fŏb* [Ger. *foppen* to banter: Norw. *fubba,* to move to and fro]: to cheat; to trick; to delude with a trick. FOB'BING, imp. FOBBED, pp. *fŏbd.*

FOBES, *fōbz,* PEREZ, LL.D.: 1742, Sep. 21—1812, Feb. 23; b. Bridgewater, Mass.: educator. He graduated at Harvard College 1762, and after teaching some time studied theology and was ordained pastor of the Congl. Church in Raynham, Mass., 1766. He served as army chaplain 1777, was elected vice-pres. of Brown Univ. and prof. of natural philosophy 1786, became a fellow of the Univ. 1795, and supervisor of Bristol Acad. 1796. He published *Sermon on the Death of Pres. Manning; Election Sermon; Topographical Description of Raynham, with its History; Scripture Catechism;* and sermons preached to the legislatures of Mass. and R. I. He received the degree LL.D. from Brown Univ. 1792.

FOCAL: see under FOCUS.

FOCIM'ETER: see CLAUDET'S FOCIMETER.

FOCUS, n. *fō'kŭs,* FO'CUSES, *-ĕz,* or FOCI, n. plu. *fō'sī* [L. *focus,* a fire, the hearth—*lit.,* a centre of fire]: the point in which rays of light or heat meet; any central point; certain points in an ellipse, parabola, and hyperbola, are called foci (see these titles). Focus, in *optics,* is a point in which several rays meet and are collected after being reflected or refracted; a *virtual* focus is a point from which rays tend after reflection or refraction: the principal focus

is the focus of parallel rays after reflection or refraction: see LENS: MIRROR: CATOPTRICS: DIOPTRIC: V. to bring to a focus or to a centre. FOCIMETER, n. *fō-sĭm′ĕ-tėr* [Gr. *metron*, a measure]: instrument for assisting in focusing an object in or before a camera; consisting usually of a lens of small magnifying power. FO′CUSING, imp. FOCUSED, pp. *fō′kŭst.* FOCUSING-GLASS, glass used for magnifying the image on the ground glass in the camera, to enable the operator to set it into better focus. FO′CAL, a. *-kăl* [F.—L.]: pertaining to a focus.

FODDER, n. *fŏd′dėr* [AS. *foder;* Icel. *fothr;* Dut. *voeder*, victuals, food: mid. L. *fodrum*, a demand for provisions for man and horse, as by an army: Gael. *fodar*, food for cattle]: food for horses, etc., generally dry, as hay or corn: V. to feed with dry food. FOD′DERING, imp. FODDERED, pp. *-dėrd.*

FODDER, n. *fŏd′dėr*, or FOTH′ER, *fŏth′ėr*, and FUD′DER [AS. *fother*, a kind of cart, a load]: a weight by which metals are sold, varying from about 19 to 25 cwt.

FODDER: food material supplied by man to domestic herbivorous animals. It embraces a large variety of herbaceous plants, many of which are extensively cultivated. Of these, the ordinary grasses and cereals are produced in the largest quantities. In England, more than 200 varieties of grass are cultivated, but in this country the number is much less, and of those grown for hay very few are universally popular. Fodder plants vary greatly in value and in the ease and profit with which they can be cultivated. Much depends also on the degree of maturity which they are allowed to reach, and the care with which they are cured. (See HAY). Besides the plants commonly termed grasses, several varieties of millet are dried for fodder, as are also the stalks and leaves of Indian corn. The various grains, as corn, oats, and rye, are largely used, and the straw of a few of the cereals is utilized for fodder to a limited extent. Of the several leguminous plants grown for fodder-clover is by far the most valuable and the most extensively grown, though the pea, bean, and lupine are cultivated in various localities. Root crops for fodder are regarded as indispensable in England, but, on account of the labor required in growing and feeding them, are in comparatively little favor here. The principal roots cultivated in this country are the beet, carrot, and turnip. The small and inferior tubers of the potato are much used for fodder, and the parsnip is grown for this purpose to a limited extent. In countries where forests abound and herbage is scanty, also where agriculture is poorly developed, the leaves and twigs of trees are a standard article of fodder.

The value of any substance for fodder depends on the quantities of albuminoids, carbo-hydrates, and fat which it contains in a digestible condition, in connection with a proper proportion of indigestible fibre to give it the requisite bulk. Too large a proportion of either of these sub-

stances makes an unbalanced ration, and, as most articles of fodder are imperfect in this respect, the mixing of different substances gives better results than a single substance. Too much fibre makes an indigestible and innutritious ration, while too highly concentrated food causes indigestion and various inflammatory diseases. The proper proportion of the nutritive elements is modified, however, by the purpose for which the animal is kept—whether for work, fattening, or the production of milk. The value to the farmer of any material for fodder depends not only on its nutritive qualities, but to a considerable extent also upon the facility and cheapness with which it can be grown and secured.

Green Fodder.—Most of the substances dried for fodder are used also in a green state. When preserved in this condition for winter use, the material is called ensilage (q.v.). The system of supplying green fodder to cattle at the barn in summer is called soiling (q.v.). On many farms pasturing and soiling are combined, the green fodder being used to supplement the pastures when, from drought or approaching maturity of the grass, the feed therein becomes insufficient in quantity or inferior in quality. Of the crops used for green fodder, Indian corn (q.v.) is one of the cheapest and best. It is probably grown on a greater number of farms than any other, and in larger quantities than all others combined. It is easily produced, and on rich land yields immense crops. Rye is sown to a considerable extent; several varieties of millet and clover also are among the principal crops grown for this purpose.

The method of growing crops for green fodder varies little from that adopted when they are to be used in a dry state. The preparation of the land must be as thorough, and fertilizers should be as freely applied. Rye is sown early in the autumn and is cut as needed in the spring. It remains good until the heads are beginning to form. Corn is usually grown in drills, in which it is planted much more closely than when grown for grain. It is also planted at intervals to form a succession, and the later plantings can be made upon land from which the first cuttings of rye are made. Grass, clover, and millet are to be cut when sufficiently grown, and any surplus can be easily and profitably cured for winter use. Where land is expensive, the use of green fodder in summer is more economical than pasturage. More animals can be maintained on a given area, and much larger quantities of manure can be saved. Even where land is cheap, there are manifest advantages in adding green fodder to the grass obtained in pastures. This course is specially indicated in the case of cows kept for dairy purposes.

FOD'DER, in Law: statute or custom as to disposal of fodder on a rented farm; important in Britain, where farms are mostly rented from large proprietors, but with little application in the United States. It is generally

implied in the rules of good husbandry that the hay and straw produced by the farm shall be consumed on it. In England, 'in the absence of any agreement respecting the removal of hay and straw, the right to do so is regulated by the custom of the country.'—Woodfall, p. 537. The custom differs not only in different counties, but in different parts of the same county. Where the outgoing tenant leaves fodder on the premises, he is entitled to no compensation, except under an express stipulation.

FOE, n. *fō* [AS. *fah*, or *fá*, an enemy—from *fian*, to hate: Goth. *fijan;* Icel. *fja*, to hate (see FEUD)]: an enemy; an adversary; an ill-wisher. FOE'MAN, n. an enemy in war.

FŒNUS, n. *fē'nŭs* [L. that which is produced, interest on money]: in *entom.*, a genus of pupivorous hymenoptera, family *Evaniadæ*. The ovipositor so slightly projects that it is like a sting. The larvæ are predatory on those of other insects. The perfect fœni frequent flowers. At night or during inclement days they hang by their mandibles to the stems of different plants.

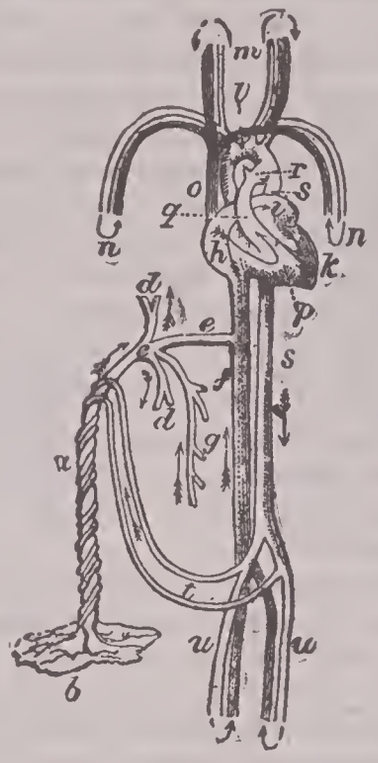
FŒTOR, n. *fē'tŏr* [L.]: a strong offensive smell.

FŒTUS, n. *fē'tŭs* [L. *fœtus*, filled with young, pregnant: It. *feto*, the embryo]: the young of animals in the womb or in the egg after assuming a perfect form; an embryo. FŒ'TAL, a. *-tăl*, pertaining to. FŒTATION, n. *-tā'shŭn*, the formation of a fœtus.

FŒ'TUS: the mammalian embryo, especially in its more advanced stages. In the human subject, the embryo at and after the end of the fourth month is termed a fœtus. In medico-legal inquiries it is frequently of great importance to ascertain the *age* of the fœtus; and to facilitate such determination, the physical characters which it presents at different ages have been carefully noted and described.—In the fœtus of nine months—the full term—the length is 17 to 21 inches; weight 5 to 9 lbs., average about 6½ lbs. Even at birth, the average length and weight of the male infant slightly exceeds that of the female. It appears that there is an average excess of length of 4·8 lines, and of weight of 12 oz., in the male infant. Various instances are recorded of infants in which the weight at birth has exceeded twice the average weight. Thus a case is recorded, in which the child at delivery weighed 17 lbs. 12 oz., and was 24 inches in length; and in another recorded instance the weight was nearly 18 pounds.

In certain points the fœtus at the full period differs anatomically from the child shortly after birth. The bony skeleton is very incomplete, cartilage occurring in the place of many bones. Indeed, complete ossification (viz., of the vertebræ) is not finished until about the 25th year, and the only bones completely ossified at birth are the minute ossicles of the ear. The difference between the fœtus and the child in this respect is, however, one only of degree. During pregnancy, a temporary organ, the placenta (popularly known as the after-birth, from its

being thrown off shortly after the birth of the child), is developed on the inner wall of the uterus (see *b* in the figure). This organ is composed mainly of vessels, and there proceeds from it the structure known as the umbilical cord, *a*, in which lie the umbilical vein, which conveys arterial blood to the foetus, and the two umbilical arteries, which return the blood to the placenta. Before tracing the course of the blood through the fœtus, we must notice the chief anatomical peculiarities presented by the vascular or circulating system before birth.—1. In the heart,



The Fœtal Circulation.

a, the umbilical cord proceeding from *b*, the placenta; *c*, the umbilical vein; *d*, *d*, its branches going to the liver; *e*, the *ductus venosus;* *f*, the inferior vena cava; *g*, the portal vein; *h*, the right auricle. The uppermost arrow indicates the course of the blood through the *foramen ovale.* *i*, the left auricle; *k*, the left ventricle. The arrow commencing in the left ventricle, and with its head on the ascending aorta, indicates the course of the blood to be distributed to the head and extremities; *l*, the arch of the aorta. The arrows *m* and *n* represent the return of the blood from the head and upper extremities, through the jugular and subclavian veins, to the superior vena cava, *o*, to the right auricle, *p*, and, as shown by the arrow, through the right ventricle, *k*, to the pulmonary artery, *q*; *r*, the *ductus arteriosus;* *s*, *s*, the descending aorta; *t*, the hypogastric or umbilical arteries; *u*, *u*, the external iliac arteries.

is a communication between the two auricles by an opening termed the *foramen ovale.* 2. In the arterial system, are (first) the *ductus arteriosus* (see *r* in the figure), a large communicating trunk between the pulmonary artery and the descending aorta; (secondly) the branches given off by the internal iliac arteries—which have the name of hypogastric as long as they are within the body of the fœtus, and of umbilical when they enter into the structure of the cord—which are continued from the fœtus to the placenta, to which they return the blood that has circulated

in the fetal system. 3. In the venous system is a communication between the umbilical vein and the inferior vena cava, called the *ductus venosus*.

Pure blood is brought from the placenta by the umbilical vein, which passes through the umbilicus, and enters the liver, where it divides into several branches, *d*, *d*, distributed to that viscus—the main trunk or *ductus venosus*, *e*, passing directly backward, and entering the inferior vena cava, *f*. The pure blood here becomes mixed with the impure blood returned from the lower extremities and abdominal viscera, and is carried into the right auricle, *h*, and thence, guided by the Eustachian valve (which is between the anterior margin of the inferior cava, and the auriculo-ventricular orifice, and is of relatively large size in the fœtus), passes through the *foramen ovale*, into the left auricle, *i*. From the left auricle, it passes into the left ventricle, and into the aorta, whence it is distributed by the carotid and subclavian arteries principally to the head and upper extremities, which thus receive comparatively pure blood. From the head and arms, the impure blood is returned by the superior vena cava to the right auricle; from the right auricle, it is propelled, as in the adult, into the right ventricle; and from the right ventricle, into the pulmonary artery. In the child, it would now pass through the lungs, and be oxygenized; but in the fœtus it passes through the *ductus arteriosus* into the commencement of the descending aorta, where it mixes with that portion of the pure blood not sent through the carotid and subclavian arteries. Some of this mixed blood is distributed by the external iliac arteries, *u*, *u*, to the lower extremities, while the remainder (probably the larger portion) is conveyed by the hypogastric or umbilical arteries, *t*, to the placenta.

From the above description it is seen—1. That a considerable quantity of the pure blood from the placenta is at once distributed to the liver, which accounts for its large size at birth as compared with the other viscera. 2. That a double current meets in the right auricle, one stream, guided by the Eustachian valve, passing through the *foramen ovale* into the left auricle, the other through the auriculo-ventricular opening into the right ventricle. 3. That the comparatively pure blood sent to the head and arms, as contrasted with the impure blood sent to the lower extremities, causes the relatively greater development of the former organs, and prepares them for the functions that they are called upon to perform; the development of the legs at birth being slight as compared with that of the head or arms.—Almost immediately after birth, the *foramen ovale* becomes closed by a membranous layer, and the *ductus arteriosus* and *ductus venosus* degenerate into impervious fibrous cords. The lungs, previously to the act of inspiration, are dense and solid in structure, and of deep-red color, and lie far back in the chest. Their specific gravity is greater than water, in which they (or portions of them) consequently sink, whereas lungs, or portions of lungs, that have respired, float in that fluid.

The full period of fetal existence is stated in general as *nine months*. The period of gestation is, however, constant only between certain limits, and it is of the greatest importance in questions of chastity and legitimacy to determine these limits.—The average duration of gestation in the human female is comprised between the 38th and 40th weeks (266 to 280 days) after conception.

It is comparatively seldom that the actual date of conception can be fixed with positive certainty; but among the few cases of this kind on record, the period has been found to vary from 260 to 293 days, a range of not less than 33 days; and many apparently authenic cases are on record in which even a longer period of gestation has been observed. Another important question is—When is the child viable, that is to say when is the earliest period at which a child can be born, to enable it to live, and to continue in life after its birth? There is no doubt that children born at the seventh month of gestation are capable of living though they usually require much care; and children may be born alive at any period between the sixth and seventh months, or even in some instances earler than the sixth; but this is rare, and if born living, they usually die soon after birth.

Questions connected with prolonged gestation have given rise to much discussion in legal medicine. No period has been fixed by law beyond which a child if born in wedlock is to be declared illegitimate. In one case British courts decided that a child born 10 months, or about 42 weeks, after intercourse with the husband, was legitimate. In the United States courts it has been decided that a child born 317 days (or 45 weeks and 2 days) after conception was legitimate. The question is important—What constitutes live-birth? This is a point on which the most distinguished obstetric authorities have differed: some holding that where there is muscular movement, there is life: while others maintain that where respiration has not been proved to have taken place, the child was stillborn. It is established in English law, that respiration is not required to establish live-birth; and the laws of France and of the United States do not require that the child shall have breathed. In Scotland, the law requires not only that the child shall have breathed, but that it shall have cried; and in conformity with this law, a child which lived, breathed, and died in convulsions at the end of half an hour, was declared to have been born dead. (Dyer's *Reports*, 25).

FOG, n. *fŏg*, or FOG′GAGE, n. *-gāj* [mid. L. *fogagĭŭm*, winter pasture: Swiss, *fasch*, thick tangled grass]: aftergrass; grass not eaten down in the summer that grows in tufts over the winter; in *Scot.*, the mosses found in pasture-lands, etc. FOGGY-BEE, the carder bee, *Bombus muscorum*, which makes its nest in moss.

FOG, v. *fŏg* [Ger. *fug*, convenience, opportunity: Gael. *fogair*, chase, hunt]: in *OE.*, to resort to mean expedients:

to make shifts. Fog'ging, imp. Fogged, pp. *fŏgd.* Fogger, n. *fŏg'gĕr*, one mean and shifty in the pursuit of legal business, as in *pettifogger*, which see.

FOG, n. *fŏg* [Dan. *fog*, in *sneefog*, a snowstorm—from *fyge*, to drive with the wind: prov. Dan. *fuge*, to rain fine and blow: Icel. *fok*, flight of things driven by the wind]: visible watery vapor floating near the surface of the earth; a thick mist, a cloud which floats immediately above the ground. It is distinguished from mist by not wetting objects exposed to it. Foggy, a. *-gĭ*, cloudy; misty; dull. Fog'gily, ad. *-lĭ*. Fog'giness, n. state of being foggy; cloudiness. Fog-bank, an appearance at sea in hazy weather resembling land at a distance, caused by fog. Fog is caused, as clouds are, by the condensation of the water vapor of the atmosphere.

Fog is formed in at least three ways, viz., where the cooling of the water vapor and consequent condensation is due to (1) contact, (2) radiation, or (3) mixing; or by combinations of two or more of these as in up-lifting and expansion. It is thought that more vapor condenses when a stream of air and vapor at low temperature impinges on a mass of warmer air than with reversed conditions. Ocean fogs as a rule form when cool air flows over warm, moist surfaces. Fog is supposed by the most recent investigators to be normally present in the lower atmosphere at least over and near the sea. It is according to F. W. Proctor 'often invisible, the visibility depending upon the size of the droplets (nuclei) and their number per unit volume of space. It is often either unnoticed or not recognized as fog because it usually has the aspect of a thin smoky haze.' A fog then may be considered as a cloud resting on the ground, and conversely a cloud is a lifted fog. The North Atlantic Ocean in the vicinity of the Grand Banks is perhaps the best known fog belt of the world. The explanation now held is, that two ocean currents of different temperature here flow near each other, the Labrador current of water from the north and the Gulf Stream whose northern limit approaches the Newfoundland coast. When southerly winds blow the cold surface of the northern waters serves to condense the water vapor in the form of fog. On the Pacific Coast, fog is noticeable and has been studied and discussed by officials of the Weather Bureau. In the vicinity of San Francisco Bay, the fog plays an important rôle in modifying climate, keeping the city warm in winter and cool in summer. The inflowing fog streams through the Golden Gate have been discussed by McAdie in the *Climatology of California*. There is also a well recognized tule fog different from the summer afternoon sea fog. These tule fogs form in the valleys and move slowly seaward. They are very dense and authentic cases are given of teams lost in these fogs within a few hundred yards of the barns. These fogs are persistent and disappear only with marked change in the lower air circulation.

Most of the fog of the North German lowlands results

from a flowing away of a moist air current over fields which have been cooled by nocturnal radiation. The result is that the lower cold air layers are tossed up by the accompanying formation of billows due to winds near the earth and which by mixture of the upper and lower layers precipitates the fluid water. More rarely fog proceeds from the mixture of two moist currents of different temperature.

In the thick yellow fog notorious as London fog, the watery particles are largely mingled with smoke and other impurities. In has been found that these fogs are not merely a serious hindrance to traffic in London, but are distinctly detrimental to health. During the great fog of 1879–80, remarkable for density and long continuance, the death-rate for several kinds of disease was very markedly increased. The only remedies proposed for the diminution of the smoky elements of fog are more complete consumption of smoke in factory furnaces, and the use in dwelling-houses of smokeless grates or stoves. In 1880, Dr. Aitken propounded to the Royal Soc. of Edinburgh a theory (Arrhenius, Thomson, Barns, Wilson, Elias and others have since added to our knowledge of nucleation and the condensation of water vapor in the free air) that pure vapor is naturally invisible, and becomes visible as cloud, mist, or fog, only after condensation around the dusty particles in the atmosphere. The dust meant includes of course not merely the grosser kinds, but also many almost impalpable powders; such, for example, as the results of the combustion by a meteorite in the upper air. But for *some* kinds of dust present in the atmosphere, there would, according to this theory, be no visible fog at all, even when the air was charged with watery moisture. The international symbol for fog is ≡; ≡° thin fog; ≡² heavy or dense fog; ≡: damp fog or mist; ⎓ ground fog.

FOG BOW: a white rainbow seen on a thick fog, due to the drops of water which float on the air being extremely small.

FOGARAS, *fō-gŏh-rŏsh':* co. of Austria, in Transylvania, on the Wallachian frontier, between the co. of Cronstadt on the e. and Hermannstadt on the w. The climate is cold and the surface of the country mostly mountainous. Cattle-breeding is extensively carried on, but no considerable agriculture. Prior to 1876 the co. was a district with a pop. of 82,852, chiefly Wallachians with some Saxons and Hungarians.—The cap. Fogaras is a fortified town on the left bank of the Aluta river, 55 m. e. of Hermannstadt. It has a Franciscan monastery, and is the see of a Cath. abp. of the Romanean rite. Pop. co. 86,943; cap. 5,307.

FOGARASSY, *fo'gŏh-rŏsh-e,* Janos (John): 1801–78; b. Käsmārk, co. of Abanj, Hungary: philologist and jurisconsult. His publications in both departments rank as standard works: among them are—*Latin-Magyar Lexicon for Legislation and Government* (2d ed. 1835); *Metaphysics of the Magyar Tongue* (1834); *Magyar-German Dictionary* (1836); *Commercial Law of Hungary* (1840); *Essays on the Spirit of the Hungarian Language* (1845).

FOG'GIA: province of Italy. See CAPITANATA.

FOGGIA, *fŏd'jâ:* town of Italy, cap. of the province of Foggia (formerly Capitanata), s. Italy; between the rivers Cervaro and Celone, in a district abounding in plantations of olives, vines, and other fruit trees, 80 m. e.n.e. of Naples. It is a handsome, well-built town, with spacious streets, good houses, and large shops. Among the chief buildings are the cathedral, a Gothic edifice originally, but partially destroyed by earthquake 1731, and rebuilt in a different style; numerous churches, some of them antique; the custom-house, a beautiful building; and the theatre. It is the centre of all the trade of the province, and has many large corn magazines. Foggia, supposed to have been built from the ruins of the ancient Arpi, was a favorite residence of Emperor Frederick II., and here died his wife Isabella, dau. of the English king, John. It was also for some time the residence of Ferdinand I. and his court, when it ranked as the second city in the kingdom. Pop. (1901) 53,151.

FOGO, *fō'gō*, or FUEGO, *fwā'gō:* island of the Cape Verde group, in the Atlantic Ocean, 320 m. w. of Cape Verde, Africa. It is nearly circular in shape, has a circumference of 40 m., and consists of a volcanic mountain towering 9,157 ft. above sea level. The climate is dry, soil very fertile, producing grain, wine, fruits, and tobacco. There have been occasional volcanic eruptions since 1860, and numerous droughts; during one (1730–34) two-thirds of the inhabitants died. Port, Nossa Senhora da Luz. Pop. (1901) about 18,000.

FOG' SIG'NALS: audible warnings used on board ships, on the sea-coast, or on railways, during fogs and mists, or at any other time when lights or ordinary daylight-signals are not available. The commonest fog-signal on ship-board is the continuous ringing of the ordinary time-bell, or striking the anchor with a hammer, with occasional discharge of musketry and heavy guns. These are adopted to prevent collisions, when ships are overtaken by a fog in places where shipping is abundant. The blowing of a horn, the beating of a drum, of an empty cask, or of a gong, and various other unusual sounds, are also adopted. Steam vessels generally blow a whistle under these circumstances. These sounds, however, indicate only in general the position of the ship, and not the direction in which she is sailing. Many plans have been devised for a code of signals, by which the directions n., s., etc., might be indicated by the varying length of each sound, or the intervals between the sounds of a fog horn or whistle. Some general code of signals of this kind is very desirable for the merchant service as well as the navy, and its recognition by the marine of all nations should be procured. Some navies have such a code for the direction of a fleet of ships of war in thick weather. (See SIGNALS.) Fog signals from the shore are very helpful, especially on a dangerous coast. Bells and guns have been used for the purpose, but when a strong wind is blowing in toward the shore,

their sound is heard only a very little distance out at sea. Consequently steam-whistles and fog-horns sounded by compressed air are being used in their stead. Fog-sirens (or siren-trumpets, for the mode of producing whose sound, see SIRENE) are now largely in use; these are audible at a distance of two to ten miles. In the United States, the Daboll trumpet, operated by air condensed in a caloric engine, is much used. Unfortunately, all sound-signals are liable to modification from various disturbing causes, such as wind, moisture, and temperature.

Fog-signals used on railways are small cases charged with detonating powder, and laid upon the rails. They explode loudly when the wheel of an advancing train comes upon them. They are used, not only in fogs, but in all cases of danger from obstruction of the line, or in any urgent need of stopping a train immediately. Station-masters and railway police are furnished with them.

Submarine Fog Signals.—A most important improvement has recently been introduced in navigation whereby bell signals are given under water. Vessels equipped with proper receiving devices are enabled to pick up the sound wave in water when several miles distant from the point at which the bell is struck.

FOGY, or FOGEY, or FOGIE, n. *fō′gĭ* [Dan. *fjog,* a dull person: Gael. *fogair,* to banish]: *colloquially,* a stupid old man; an elderly person who has no sympathy with the amusements and pursuits of the young; applied to old soldiers when embodied for drill or garrison duty. FOGYISM, the manner, habits, or characteristics of a fogy.

FOHN, n. *fōn* [L. *făvōnĭŭs,* the west wind]: the Swiss name for the hot southerly winds of summer.

FÖHR, *fėr:* island in the North Sea, on the w. coast of Schleswig; about 28 sq. m. It is divided into *Osterlandfohr* which always belonged to Schleswig, and *Westerlandfohr* ceded by Denmark to Schleswig 1864. The inhabitants are mostly Frisians. The chief place is Wyk (pop. 1,000). Pop. of island, abt. 4,150.

FOIBLE, n. *foy′bl* [F. *foible,* weak]: a weak point in character; a moral weakness or infirmity; a failing.—SYN.: fault; imperfection; weakness; infirmity; defect; frailty.

FOIL, v. *foyl* [F. *fouler,* to press, to tread—from It. *follare*—from mid. L. *fullārĕ,* to full cloth: F. *affoler,* to spoil, to befool—from *fol,* a fool]: to frustrate; to defeat; to baffle; to render unavailing; N. defeat; frustration. FOIL′ING, imp. defeating; frustrating. FOILED, pp. *foyld.* FOIL′ER, n. one who.

FOIL, n. *foyl* [F. *refoulé,* dulled, blunted: Gael. *foil,* gentle, soft]: blunted weapon, a thin bar of elastic steel, mounted as a rapier (q.v.), with a leather-covered button on its end, used in fencing or in learning the sword exercise: see FENCING.

FOIL, n. *foyl* [F. *feuille*—from *fŏlĭŭm,* a leaf]: general name for thin metal intermediate in thickness between *leaf-*

metal, such as gold, silver, and copper leaf, and *sheet-metal*. Two kinds are in common use—the tinfoil for silvering looking-glasses, lining tea-caddies, and similar purposes, and for the conducting coatings of electrical apparatus; and the bright foils employed by jewellers for backing real or artificial gems, thereby increasing their lustre or modifying their color. The tinfoil is made by rolling out tin, or, recently, by the method of Mr. Wimshurst, who casts a cylinder of the metal, and then, by means of a knife or cutter, shaves it into a sheet as the cylinder rolls to the knife which is gradually moved inward toward the axis of the cylinder at a rate proportionate to the required thickness of the sheet.

The bright foil used by jewellers and for theatrical and other ornaments under the name of 'tinsel,' is made of copper, tin, tinned copper, or silvered copper. The last is now chiefly used by jewellers. The metal is rolled in a flatting mill, and the requisite brilliancy of surface is produced by finishing between burnished rollers and polishing. The various colors are produced by coating the white metal with transparent colors mixed in isinglass size. A similar varnish without color is laid over the white foil, to prevent tarnishing. The socket, or setting, in which the stone or paste is mounted is lined with the foil, and by reflecting from the internal facets the light which passes through the stone, adds considerably to its brilliancy. The natural colors of real stones are sometimes heightened or modified by colored foil, and factitious colors are thus given to the glass, or 'paste,' as it is called, of which spurious gems are made. There are two other methods of foiling gems, distinct from the above: one of them is to line the socket of the setting with tin foil, then fill it while warm with mercury; after a few minutes the fluid mercury is poured out, and there remains an amalgam of tin, precisely the same as is used for backing common mirrors; the gem is fitted into this, and thus its back has a mirror surface. The other method is to precipitate a film of pure metallic silver upon the back of the stone, by submitting a solution of the ammonia nitrate of silver in contact with the stone to the reducing action of the oils of cassia and cloves. The silvering of looking-glasses being the chief use to which the ordinary *tinfoil* is applied, its purity is a matter of great consideration; its employment also by chemists, as a ready means of forming some of the tin compounds, renders this absolutely necessary. Nevertheless, the spirit of adulteration has infected the tinfoil makers, and lead has been extensively alloyed with the tin. In some analyses recently made, it has been shown that as much as 85 per cent. of the adulterant metal has been used, the effect of which in the process of silvering mirrors is most injurious to the brilliancy of the amalgam, which should consist of perfectly pure tin and quicksilver. For chemical purposes, it is now absolutely necessary to test for lead before using *tinfoil*.

The foils used by jewellers for backing gems, consisting of small sheets of silvered copper rolled very thin, are colored with the following preparations to suit the different gems under which they are to be placed, or for use as tinsel in the manufacture of theatrical ornaments, toys, etc.: Lake and Prussian blue, and pale drying-oil, finely ground with a slab and muller—for *amethyst* color. Prussian blue, similarly prepared—for *sapphire* color. Dragons' blood dissolved in pure alcohol—for *garnet* color. Sesquiferrocyanide of iron and bichromate of potash, equal parts very finely ground and sifted, then ground with a quantity of gum-mastic equal to the other two ingredients, until the whole forms an impalpable powder; this gradually formed into a thin paste with pure wood-spirit (pyroxylic) and preserved in stoppered bottle; when used, a portion is diluted with wood-spirit to the necessary thinness—for *emerald* color. Various shades of yellowish or bluish green can be produced by varying the proportions of the two coloring materials. Lake or carmine, ground in solution of isinglass —for *ruby* color. A weak solution of orange-shellac, sometimes tinted with saffron, turmeric, or aloes—for *topaz* color. Several other color-varnishes are made by similar methods for various shades of tinsel and gem foils. See SILVERING.

FOIL, in *arch.*, is one of the small arcs in the tracery of Gothic windows, panels, etc.—so named probably as being a conventionalized leaf-form.

FOIN, v. *foyn* [OF. *foigner*, to make a feint; *fouine*, a fish-spear]: in *OE.*, to make a pass or thrust in fencing: N. a thrust or push with the sword or foil in fencing. FOIN'ING, imp. FOINED, pp. *foynd*.

FOISON, n. *foy'zn* [F. *foison*, abundance—from L. *fūsĭōnĕm*, a pouring forth—from *fusus*, poured]: in *OE.*, the natural juice or moisture of grass or herbage; the heart and strength; abundance; plenty. *Note.*—FOISON, in Scotch denotes abundance; pith; ability; essence. FOI'SONLESS, or FIS'SENLESS, a. destitute of substance or pith; dried; withered.

FOISSONNEMENT, n. *fwâ'sŏn-măng'* or *foy'sŏn-mĕnt* [F. *foissonnement*, property of increasing—from *foissonner*, to increase]: in *mil.*, the increase in the bulk of earth after its excavation—a term used in fortification.

FOIST, v. *foyst* [Ger. *fist*, an ill smell: Dut. *veest*, wind from the bowels: Icel. *fysa*, to breathe, to break wind in a noiseless manner]: to introduce something surreptitiously; to insert by fraud or forgery, or without authority. FOIST'ING, imp. FOIST'ED, pp. FOISTY, a. *foyst'ĭ*, moldy; fusty. FOIST'INESS, n. fustiness; moldiness.

FOIX: old French family, which took the title of count from the district of Foix (now the dept. of Ariège), in the s. of France. The first who bore the title was Roger, Comte de Foix, middle of the 11th c. Raymond, Comte de Foix, figures as one of the knights who accompanied King Phi-

lippe Auguste to Palestine; afterward, being accused of heresy, his estates were seized by Comte de Montfort: he d. 1223. Several members of the family subsequently distinguished themselves in the wars against England.

Gaston III., Comte de Foix (1331–91), called Phœbus, on account of the beauty of his person, was noted for knightly love of splendor and military prowess. For his services to the king, he was made gov. of Languedoc and Gascony. When only 18 years old, he married Agnes, dau. of Philip III., King of Navarre. In 1358, during the insurrection known as the *Jacquerie* (q.v.), he delivered the royal family from the power of the rebels. When Charles VI. wished to deprive him of the government of Languedoc, he maintained his position by force of arms, and defeated the Duc de Berri in the plain of Revel. He was inordinately attached to the chase, and is said to have kept 1,600 dogs. He wrote a work on the subject, entitled *Miroir de Phébus des deduitz de la Chasse des Bestes sauvaiges et des Oyseaulx de Proye*, which went through several editions in the 16th and 17th c., and whose bombastic style (*faire du Phébus*) became a byword. Froissart owed some of the choicest incidents in his history to having lived for some time in the castle of Orthes, Gaston's principal residence. After his death, the estates and title went to a collateral branch of the family.

Gaston IV., Comte de Foix, rendered good service to the king in the wars against England. In 1455, his father-in-law, John II., King of Navarre, named him his successor. In addition to this, Charles VII. created him a peer of France, and ceded to him his claims on Roussillon and Cerdagne. He died 1472, when the family possessions were again divided.

Gaston de Foix, (1489–1512, Apr. 11), grandson of Gaston IV., and son of Jean de Foix, Comte d'Estampes, and of Marie d'Orleans, sister of Louis XII. of France—last and probably most heroic member of the family. In 1507, he received from his uncle, the French king, the title of Duc de Nemours. In the Italian wars carried on by Louis, Gaston displayed the most brilliant and precocious genius. He twice overthrew the Swiss, at Como and Milan; chased Pope Julius II. from Bologna; seized Brescia out of the hands of the Venetians; and, to crown a series of splendid triumphs, which obtained for him the title of the *Thunderbolt of Italy*, won the great battle of Ravenna over the Spaniards, 1512, Apr. 11, in which, however, he fell, at the early age of 23.—On his death, the estates and title of the house of Foix went to Henry, King of Navarre, whose dau., Jeanne d'Albret, married Antoine de Bourbon, Duc de Vendôme, and became mother of the great Henri Quatre, who thus attached the county of Foix to the French crown.

FO-KIEN: see Fuh-Keen.

FOLCLAND, or Folkland, *fōk'lănd:* land of the folk or people in England in Anglo-Saxon times. The Folcland, according to Turner, was that portion of the kingdom re-

tained in behalf of the public with a view to increasing population and to the growing wants of the community, and not permitted to become allodial estate or absolute private property. Of this land, the usufruct or *dominium utile* was enjoyed by the freemen, for which certain rents were paid to the state, and which did not become hereditary. The rights held in it by individuals reverted to the community at the expiry of a particuliar term, when it was again given out by the folcgemot, or court, of the district, either in commonty or in severalty. Certain services to the public were commonly imposed on the holders of Folcland, such as the reparation of the royal vills and other public works; the exercise of hospitality to the king, and to other personages of distinction in their progresses through the country, by furnishing them and their messengers, huntsmen, hounds, hawks, and horses with food, and providing them, when necessary, with means of transport. It does not seem that the Folcland was held exclusively by the common people, but rather that it was open to freemen of all ranks and conditions, and that the possession of it was much coveted even by those who held great estates on the hereditary title which was known as *Bockland* (q.v.). Folcland was often given out as bockland to those who had performed great public services, just as Horatius was rewarded by a grant of the Roman *ager publicus*—

> 'They gave him of the corn-land
> That was of public right,
> As much as two strong oxen
> Could plow from morn till night!'

Folcland was also given frequently to the church, for founding monasteries and the like, a practice of which Bede complains in his celebrated letter to Abp. Egbert: 'It is disgraceful to say, persons who have not the least claim to the monastic character, as you yourself best know, have got so many of these spots into their power, under the name of monasteries, that there is really now no place at all where the sons of nobles or veteran soldiers can receive a grant.' —Kemble's *Saxons*, p. 291. Kemble gives examples of the dues paid by monasteries for the Folcland which they held, which afford curious information as to the products of industry and modes of living of those times. In 883, a monastery was freed from all dues which the monks were still bound to pay to the king's hand, including bright ale, beer, honey, oxen, swine, and sheep. The dues of the monastery at Taunton were: a feorm (or entertainment) of one night to the king, and eight dogs and one dogkeeper; and nine nights' keep for the king's falconers, and carriage, with wagons and horses, for whatever he would have taken to Curry or Wilton; and, if strangers came from other parts, they were to have guidance to the nearest royal vill on their road.

FOLD, v. *fōld* [AS. *fealdan;* Goth. *falthan;* Icel. *falda;* Ger. *falten*, to lay together, to fold: W. *ffill*, a twist]: to double; to bend one part over another. N. the doubling of any substance; a plait. Fold'ing, imp.: Adj. doubling;

that may close over another; consisting of leaves that may close one over the other: N. a doubling. FOLD'ED, pp. FOL'DER, n. one who; a flat piece of bone or ivory used in folding papers.

FOLD, n. *fōld* [AS. *fald;* Gael. *fal*, a circle, a penfold: W. *ffald*, a sheep-cote]: a place to confine sheep or other animals; a flock of sheep: V. to shut up or confine, as sheep in a fold. FOLD'ING, imp.: N. the keeping of sheep in inclosures. FOLD'ED, pp. FOLDAGE, n. *fōld'āj*, the right of folding sheep.

FOLD: in geology, a term used to denote an inclined position into which various disturbances may have moved rocks previously horizontal. Even very brittle rock may be thus folded, rather than broken, under a severe, steady pressure. Three kinds of fold are generally distinguished: (1) monocline, in which the rocks are inclined in one direction only; (2) anticline, in which they are bent up in the manner of an arch; and (3) syncline, in which the arch is bent downward instead of up. Folds are rarely symmetrical. See DIP; FAULT.

FOLDING MACHINES: the folding of printed sheets for books or newspapers was performed by hand up to 1856, when Cyrus Chambers, Jr., of Philadelphia, invented a practical folding machine, which was manufactured by him and his brother Edwin, who within a few years produced a considerable line of folders of various sizes and capacities. The folding machine of C. S. Forsaith, of Manchester, N. H., designed for folding newspapers only, came out some years later. A good many Stonemetz folders were sold between 1880 and 1890. The leading folders on the American market to-day are the Dexter, the Chambers, and the Brown. The vital principle on which nearly all paper folders are based is the descent of a dull blade on the paper sheet at the point where the fold is to be made, the blade thrusting the paper between rotating rollers, which draw it in folded. The making of a second fold is accomplished in the same way, the paper being passed along by traveling tapes from one stage to another, up to three or four folds. The earlier machines were not positive in their register, that is, the fold was apt to vary slightly in position, but the modern machines are very accurate, and large 64-page sheets are commonly folded on the machines with entire satisfaction. The heavy coated paper introduced about 1890 to 1895 developed a tendency to buckle or crease slightly on the last fold of a large sheet, and the most recent folding machines have introduced devices to overcome this difficulty. The most conspicuous improvement of recent years has been the drop-roll, which has added materially to the speed of the machines. This was introduced by Dexter, and enabled the sheet to be fed sideways —that is, the shortest way. Registering by means of points, that slip into holes or slits in the sheet, is another feature of modern machines.

FOLENGO. *fo-lĕn'gō*, TEOFILO (known as MERLINO

Cocajo, or Coccai): macaronic poet: 1491–1554: b. Mantua, Italy; brother of Giambattista Folengo, monk and scholar. He was of noble family, became a Benedictine monk when 16 years old, began writing vivacious and burlesque poems in a mixed Latin and Italian dialect, and, when 25 years old, gave up monastic life and with Girolama Dieda, a young woman of good family, became a wanderer through the country, supporting himself and companion by his poetical compositions. He published a coarse poem, *Merlini Cocaii Macaronicon*, which attained wide popularity; and followed it with *Orlandino*, a work of 8 cantos and rhymed octaves. In 1526, he returned to monastic life, wrote a poem descriptive of his wanderings, then turned his attention to religious poems, and for a time had charge of a monastery in Sicily.

FOLEY, *fō'lĭ*, John Henry, r.a.: 1818, May 24—1874, Aug. 27; b. Dublin: sculptor. He was entered as a student in the Dublin Royal Soc. when 13 years old, and, after obtaining numerous prizes, removed to London and became a student in the Royal Acad. 1834. In 1839, he made his first exhibition, and 1844, as one of the successful candidates for the contract for decorating Westminster Palace with statues, began his public work, which comprised statues of John Hampden, Selden, Sir Charles Barry, Outram, and a bronze equestrian of Lord Hardinge, which was erected in Calcutta. His later works included the statue of the prince consort and the group *Asia* for the Hyde Park national memorial, and statues of Oliver Goldsmith, Edmund Burke, and Father Matthew for Ireland, and of Gen. 'Stonewall' Jackson for the state of S. C., besides a number of ideals.

FO'LEY, Thomas, d.d.: 1822, Mar. 6—1879, Feb. 19; b. Baltimore: Rom. Cath. bp. He was educated at St. Mary's College, Baltimore, and the theol. seminary of St. Sulpice; was ordained priest 1846, Aug. 16; was appointed to the charge of Rom. Cath. missions in Montgomery co., Md.; was two years asst. pastor of St. Patrick's Church, Washington; served 22 years in the Cathedral, Baltimore; became sec. to Abp. Kenrick 1851, chancellor of the archdiocese of Baltimore, vicar-gen. 1867, coadjutor to the bp. of Chicago 1867, and bp. 1870, Feb. 27. He was an accomplished scholar and orator, beloved by all who knew him.

FOLGER, *fōl'jėr*, Charles James, ll.d.: 1818, Apr. 16—1884, Sep. 4; b. Nantucket, Mass.: lawyer. He graduated at Hobart College, Geneva, N. Y., 1836; was admitted to the bar 1839; appointed judge of the Ontario co. court of common pleas 1843, and master and examiner in chancery; was co. judge 1851–56; state senator 1861–69, chairman of the judiciary committee for the entire period, and pres. *pro tem.* four years; chairman judiciary committee of the constitutional convention 1867; asst. U. S. treas. at New York 1869–70; elected associate judge N. Y. court of appeals 1871, and appointed chief justice 1880; re-elected judge for 14 years 1880; resigned 1881 to become sec. of the

U. S. treas.; and was defeated by Grover Cleveland as republican candidate for gov. of N. Y. 1882; this defeat of one so widely honored was occasioned by a bitter quarrel in the republican party of that state.

FOL'GER, Peter: 1617–1690; b. England: colonist and author. He removed from Norwich, Eng., to Watertown, Mass., 1635; settled in Martha's Vineyard 1641; taught school, surveyed, and labored as missionary among the Indians; removed to Nantucket 1663; became a Bapt. minister, and was clerk of the court. His daughter Abiah became mother of Benjamin Franklin. Among his publications was a poem, *A Looking-Glass for the Times; or the Former Spirit of New England revived in this Generation* (1675; 1763).

FOLGORE, *fōl'gō-rā*: Italian poet. He flourished at the end of the 13th century, but the dates of his birth and death and the incidents of his life are unknown. He wrote a number of sonnets, all of which have been translated into English by Dante Rossetti and J. A. Symonds. Their poetic merit is far from contemptible, and they are particularly interesting from the vivid light which they throw on Italian society. Their prevailing tone is one of refined epicureanism, and their style is mainly remarkable for affluence of imagery. 'Every line,' says Mr. Symonds, 'presents a picture, and each picture has the charm of a miniature fancifully drawn and brightly colored on a missal marge.' See Rossetti, *Dante and His Circle* (1874); and Navone, *Le Rime di Folgore* (1880).

FOLIACEÆ, n. *fō-lĭ-ā'sē-ē* [L.]: division of *Cellulares*, or cellular plants, comprehending the foliaceous orders *Filices*, *Equisetaceæ*, *Lycopodineæ*, and *Marsilaceæ*. It was distinguished from the *Aphyllæ*, containing the Mosses, Lichens, Algæ, Fungi, etc.

FOLIACEOUS, a. *fō'lĭ-ā'shŭs* [L. *folĭācĕŭs*, like leaves—from *folĭŭm;* Gr. *phullon*, a leaf: F. *foliacé*]: leafy; consisting of leaves: having the form of a leaf or thin plate. Foliage, n. *fō'lĭ-āj* [F. *feuillage*, leaves of a tree—from F. *feuille;* L. *folĭŭm*, a leaf]: leaves of a tree collectively; a cluster of leaves. Fo'liaged, a. *-ājd*, furnished with foliage. Fo'liate, v. *-āt* [L. *folĭātus*, leaved, leafy]: to beat into a leaf or thin plate; to cover with a coating, as of a metal: Adj. leaved or having leaves. Fo'liating, imp. Fo'liated, pp.: Adj. consisting of plates or thin layers; resembling a thin plate or a leaf. Fo'lia'tion, n. *-ā'shŭn*, the leafing of plants; the act of beating metal into thin plates; leaf or foil; the manner in which the young leaves of plants are arranged in the leaf bud: in *geol.*, the plates into which certain crystalline rocks are divided; a term restricted by Darwin, and subsequently by geologists, to the alternating layers or plates of different mineralogical nature, of which gneiss and some other metamorphic schists are composed. It differs from cleavage, which is applied to the divisional planes that render a rock fissile, though to the eye it is quite or nearly homogeneous; and from lamination,

which is the easy splitting of a rock into its original layers of deposition. Its cause is not determined. FOLIATE-CURVE, in *geom.*, curve of the third order, consisting of two infinite branches, with a common asymptote, which intersect each other so as to form a leaflike branch. Its equation is $x_3+y_3=a$, x, y. FOLIFEROUS, a. *fō-lĭf′ĕr-ŭs* [L. *fĕrō*, I bear]: producing leaves. FOLIOUS, a. *fō′lĭ-ŭs*, leafy. FOLIOSE, a. *fō′lĭ-ōs*, in the form of a leaf, as certain lichens. FO′LIOLE, n. *-ōl*, a leaflet.

FOLIA MALABATHRI, *fō′lĭ-â măl-a-bā′thrī*, i.e., Malabar Leaves: aromatic tonic, formerly in much repute as a medicine; the dried leaves of *Cinnamomum nitidum*, and partly of *C. Tamala*, small Indian trees or shrubs.

FOLIO, n. *fō′lĭ-ō* [It. *foglĭo*, two opposite pages; old It. and Sp. *folio*, the leaf of a book—from L. *fŏlĭŭm*, a leaf]: in *book-keeping*, the right and left hand pages; a page; any book of the largest size formed by once doubling a sheet of paper; in *law writing*, a page containing a certain number of words, in England ranging from 72 to 90, in New York 100. IN FOLIO, when a sheet makes but two leaves without further folding. FOLIO-POST, a flat writing-paper, usually 17×24 inches.

FOLK, n. *fōk* [AS. *folc;* Icel. *fylki*, or *fulki*, a troop, a district: L. *vulgus*, the people: Pol. *pulk*, a regiment of soldiers: comp. Gael. *fo-luchd*, the lower or under people]: people in general, whether young or old; mankind; nations. FOLK-LAND: see FOLCLAND. FOLK-LORE, or FOLKS-LORE, *fōk′lōr* [*folk*, and *lore:* Ger. *volkslehre*]: see next page. FOLK-MOTE, *-mōt* [AS. *mot*, an assembly]: an assembly of the people; a Saxon term for district meetings generally, though Kemble maintains that it was originally the great meeting of the nation, afterward converted into the Witenagemôte (q.v.). See Kemble's *Saxons in England*, II. 194. FOLKRIGHT, mentioned in the laws of King Edward the elder, denotes rights which the common law assigns to the people of England.

FOLK, JOSEPH WINGATE: American lawyer and politician: b. Brownsville, Tenn., 1869, Oct. 28. After graduating at Vanderbilt University he studied law and was admitted to the bar in 1890. He later moved to Saint Louis, Mo., where he became prominent in politics, as district attorney, bringing to justice and punishing the political 'ring' who had robbed the public treasury. As a result of his efforts nearly 20 officials and officers of corporations were exposed and sentenced to terms in prison, and afterward he similarly exposed some of the state legislators. This earned for him in 1904 the nomination of the Democratic party for the office of Governor and he was elected though the state went Republican in the National election.

FOLKES, *fōlks*, MARTIN, LL.D.: 1690–1754; b. Westminster: English scholar and antiquary. He was educated at Clare Hall, Cambridge. In 1713, he was chosen a fellow of the Royal Soc. of London, and 1741 he suc-

ceeded Sir Hans Sloane as pres. of that learned body. He was also a member of the Antiquarian Soc., and of the Royal Acad. of Sciences at Paris. Folkes was the author of *A Table of English Gold Coins from the 18th Edward III., when Gold was first coined in England* (Lond. 1736, 4to), with *A Table of English Silver Coins, from the Norman Conquest; to which is added an Appendix, answering the Coins minted in Scotland since the Union of the two Crowns* (Lond. 1745, folio), published under the care of the Antiquarian Soc., superintended by Dr. Giffard (1763, 2 vols.). He contributed papers to the *Philosophical Transactions.*

FOLK-LORE, *fōk'lōr:* department of antiquities or archeology, relating to ancient observances and customs, also legends, traditions, and superstitions among the common people. In England, the literature of this subject commenced with the *Miscellanies* of John Aubrey, 1696, in which are chapters on Omens, Dreams, Corpse Candles, Second Sight, etc., rather, however, the superstitions, than the ordinary observances and customs of the people. The first book on the general subject of folk-lore was an octavo vol. by the Rev. Henry Bourne, published Newcastle 1725, under the title of *Antiquitates Vulgares, or the Antiquities of the Common People.* It consists mainly of an account of popular customs in connection with the feasts of the church. Fifty years later, John Brand, M.A., native of Newcastle, published at that city the first ed. of his *Observations on the Popular Antiquities of Great Britain,* subsequently enlarged by himself, partly from the stores of folk-lore in the *Statistical Account of Scotland* (edited by Sinclair, 1791–95), but reissued, thoroughly revised, in 1813 (2 vols.), by Sir Henry Ellis of the British Museum. This work, in which Bourne's was incorporated, has been largely supplemented by Hone's *Every-day Book* and *Year Book,* Chambers's *Book of Days* (2 vols.), and *Notes and Queries.* Thus, there is now accessible much information on popular festivals of every kind; on all observances in domestic life, as marriages, sepulture, etc.; on fireside amusements; on superstitions and vulgar errors. What may be called a sub-section of folk-lore has been amply illustrated in *Nursery Rhymes,* edited by J. O. Halliwell, and *Popular Rhymes of Scotland,* edited by Robert Chambers. While folk-lore has thus been engaging the attention of literary men, and put beyond risk of oblivion by taking its place in solid books, it is everywhere declining among the people. To this effect, the diffusion of scientific ideas, the disfavor of the clergy for everything connected with the supernatural except religion itself, and the great industrial changes and improvements of the last 50 years, with an increased shifting of the people from one district to another, all have conduced. In Germany, the learned brothers Jacob and Wilhelm Grimm have turned the ancient simple usages and traditions of the peasant's fireside to excellent account in illustrating remote periods of the national history.

The columns of *Notes and Queries,* and the publications of the folk-lore Soc., established 1874, with translations of

folk-lore tales from other countries, have widened the horizon for English students, and given this department a historical importance. Among important recent books on this subject are Busk's *Roman Folk-Lore;* Calloway's *Nursery Tales of the Zulus;* Campbell's *Popular Tales of the West Highlands;* Dasent's *Popular Tales from the Norse;* Hahn's *Griechische u. Albanesische Mährchen;* Ralston's *Russian Folk-Lore;* Sébillot's *Contes Populaires de la Haute-Bretagne* (3 series); the two series, *Les Littératures Populaires de toutes les Nations* (Paris, Maisonneuve, 18 vols., to 1883), and *Collection de Contes et de Chansons Populaires* (Paris, Leroux, 7 vols., to 1883); *Biblioteca de las Tradiciones Populares Españolas* (Madrid, 6 vols., to 1884); and Crane's *Italian Popular Tales* (1885). The *Folk-Lore Journal* in England, *Mélusine* in France (commenced 1878, second vol. that for 1885), *Archivio per lo Studio delle Tradizioni Popolari* (commenced 1882) in Italy, and *Boletin Folklorico Español* in Spain, are journals specially for this study. For the philosophy underlying folk-lore, see Tylor's *Primitive Culture,* and Lang's *Custom and Myth* (1884).

FOLKMAR, Daniel, American anthropologist: b. Roxbury, Wis., 1861, Oct. 28. He was graduated at the Western College of Iowa in 1884 and continued his studies at Paris and Berlin. He subsequently taught in several western institutions of learning (1895–1900) and was professor of anthropology in the Université Nouvelle of Brussels 1898–1901. Among his many writings are: *L'Anthropologie Scientifique* (1899); and *Leçons d'Anthropologie Philosophique* (1900).

FOLK PSYCHOLOGY. See Psychology.

FOLKS, *fōks,* Homer, American sociologist: b. Hanover, Mich., 1867, Feb. 18. He was graduated from Albion College (Mich.), in 1889, from Harvard in 1890, was superintendent of the Pennsylvania Children's Aid Society 1890–3, and in 1893 became secretary of the New York State Charities Aid Association. In 1900 he assisted the United States military government of Cuba in reorganizing the public charities of the island. He has written a *History of the Care of Destitute, Neglected and Delinquent Children in the United States during the 19th Century.*

FOLLEN, *fŏl'ĕn,* August (or Adolf) Ludwig: 1794, Jan. 21—1855, Dec. 26; b. Giessen, Germany: poet. He studied theology and philology in Giessen, was in the campaign against France 1814, studied law at Heidelberg, became editor of the *Allgemeine Zeitung* at Elberfeld 1817, was imprisoned for political reasons 1819–22, and subsequently settled in Berne, Switzerland. He published translations of Homer (1814) and Latin hymnologists (1819), *Free Voices of Fresh Youth* (1819), and *Picture-gallery of German Poetry* (1827).

FOL'LEN, Charles Theodore Christian, ph.d., ll.d.: 1796, Sep. 4—1840, Jan. 13; b. Romrod, Hesse-Darmstadt: Unit. minister and author. He was educated

at Giessen, served with his brother August Ludwig Follen in the campaign against Napoleon 1814, fled to Switzerland on account of persecutions for his political opinions 1820, and became prof. of law in the Univ. of Bâle 1821. His liberal views of theology, as well as of politics, led the Holy Alliance to demand his deliverance for trial 1824, when he fled first to Paris, then to the United States. Through the influence of Lafayette and other friends, he was appointed tutor of German in Harvard Univ. 1825. He studied divinity with Dr. Channing, and was ordained a Unit. minister and appointed prof. of ecclesiastical history and ethics in the Cambridge Divinity School 1828, and 1830 became also prof. of German language and literature. Follen was pastor of the First Unit. Church, New York, 1836–7, from which he retired as a result of his opposition to slavery; and 1839 was called to East Lexington, Mass. While *en route* to his new church, he perished in the burning of the steamboat *Lexington* on Long Island Sound. He published a *German Reader* (1831), *Practical Grammar of the German Language* (1831), and numerous essays, lectures, and sermons. He received his degree from Giessen University, 1818.

FOLLEN, Eliza Lee Cabot, American author: b. Boston, Mass., 1787, Aug. 15; d. Brookline, Mass., 1860, Jan. 26. She was married to Charles T. C. Follen (q.v.) in 1828. She published: *Poems* (1839); *Twilight Stories* (1858); *Home Dramas* (1859), etc.

FOLLICLE, n. *fŏl′lĭ-kl* [F. *follicule*—from L. *follĭcŭlŭs*, a small bag or ball inflated with air—from *follis*, a bag or bellows]: an air-bag; a little bag; a cavity; a pod opening along one side, to which the seeds are attached, as in the peony. Follicŭlous, a. *fŏl-lĭk′ū-lŭs*, or Follic′ular, a. *-ū-lėr*, having or producing follicles. Follicular glands, small rounded secreting bodies, in various parts of the alimentary mucous membrane. They are called also Conglobate and Lymphoid Glands, and may be solitary or agminated.

FOLLOW, v. *fŏl′lō* [AS. *folgian;* Ger. *folgen;* Icel. *fylgia*, to follow]: to go after or behind; to succeed in order; to come after; to attend; to pursue; to result from or ensue; to adopt; to practice, as a trade. Fol′lowing, imp.: Adj. being next after; succeeding; subsequent: N. body of followers. Fol′lowed, pp. *-lōd*. Fol′lower, n. a disciple; an imitator; a companion; a male sweetheart, as of a servant. Camp followers, civilians who accompany troops as servants, sutlers, etc.—Syn. of 'follow': to chase; accompany; obey; watch; understand; walk in; attend upon; succeed; imitate; copy; embrace; maintain; ensue;—of 'follower': copier; adherent; partisan; dependent; attendant.

FOLLY, n. *fŏl′lĭ* [from *fool:* F. *folie*, folly—from *fol*, mad, crazy—from mid. L. *follus*, one who grimaces: L. *follis*, a grimace by puffing out the cheeks]: a weak or absurd act; a weakness of mind; sin.

FOLLY ISLAND, *fŏl'lĭ īl'and:* sea-island of Charleston co., St. C., extending from Lighthouse Inlet on the n.e. to Stone river, on the s.w., with the Altantic Ocean on the s.e., and Folly Island river on the n.w. A large part of its surface is heavily covered with timber. Folly Island was a point of considerable importance during attacks on Charleston in the war of secession.

FOLSOM, Charles, American scholar: b. Exeter, N. H., 1794; d. 1872. He was graduated from Harvard in 1813, was in the navy as chaplain and midshipmen's instructor in mathematics, was tutor at Harvard in 1821–3, and librarian in 1823–6. In 1824 he was associated with William Cullen Bryant in the editorship of the *United States Literary Gazette*. As a member of the printing firm of Folsom, Wells & Thurston he long prepared for the press the classical works used at Harvard. Publications: An edition of Cicero's selected orations (1811), and an edition of selections from Livy (1829).

FOLSOM, Charles Follen, American physician: b. Haverhill, Mass., 1842, April 3. He was graduated from Harvard in 1862, was in the Southern States in connection with the Freedmen's Bureau from 1862 to 1865, and after study in the Harvard Medical School practised medicine in Boston from 1870. In 1877–82 he was lecturer in hygiene at Harvard, and in 1879–88 lecturer in and assistant professor of mental diseases. Among his writings is a volume on *Mental Diseases*.

FOLSOM, George, American antiquary: b. Kennebunk, Maine, 1802, May 23; d. Rome, Italy, 1869, March 27. He was graduated 1822, studied law, and removing to New York in 1837 became librarian of the New York Historical Society. He was a member of the New York State senate 1844–8, and was appointed *charge d'affaires* at the court of the Netherlands 1850–4, and was for some years president of the American Ethnological Society. Among his publications are: *History of Saco and Biddeford, Maine* (1830); edition of the *Collections of the New York Historical Society* (1841), translation of *Despatches* of *Hernando Cortes*; *Political Condition of Mexico* (1843); *Documents Relating to the Early History of Maine* (1858).

FOLSOM, Joseph L., American soldier: b. Meredith, N. H., 1817, May 19; d. San José, Cal., 1855, July 19. He was educated at West Point, and served four years in Florida against the Indians (1840–4), and in California in the Mexican war. He communicated officially to the government the discovery of gold in that State; and Folsom City on the American River, near the earliest found gold deposits, is named after him, as one who became identified with the development of the State and especially of San Francisco, where he was a large property owner.

FOLSOM, *fōl'som*, Nathaniel: 1726–1790, May 26; b. Exeter, N. H.: legislator. He was a capt. in the French war 1755, col. of militia prior to the revolutionary war,

brig.gen. at the siege of Boston, member of the continental congress 1774–5, 1777–80, councilor 1778, and pres. of the N. H. constitutional convention 1783.

FOLTZ, PHILIPP VON, *fē′lēp fŏn fōlts*, German painter: b. Bingen, 1805, May 11; d. Munich, 1877, Aug. 5. At Munich he was a pupil of Cornelius, whom he assisted in the decoration of the Glyptothek and the arcades in the Hofgarten. He was later a professor in the Academy, and in 1865–70 director of the Central Gallery. His historical paintings are minute and faithful in detail and skilfully designed in their pictorial arrangement, but they fail of proper effect from stilted drawing and dryness of color. The Cologne Museum possesses his *Minstrel's Curse* (after Uhland's ballad); the Maximilianeum, Munich, his *Humiliation of the Emperor Frederick I. before Duke Henry the Lion*, and *Pericles attacked by Cleon and his Followers*.

FOL′WELL, WILLIAM WATTS, American educator: b. Romulus, Seneca Co., N. Y., 1833, Feb. 14. He was graduated at Hobart College, later becoming assistant professor of mathematics there; was appointed professor of mathematics at Kenyon College, Ohio, 1869, becoming president of the University of Minnesota the same year, later, professor of political economy there. Author of *Public Instruction in Minnesota* (1875); *Lectures on Political Economy*.

FOMALHAUT, n. *fō-mâl-hawt′* [Arab. *Fom-al-hût*, mouth of the large fish—from *fom*, *fam*, mouth *hût*, a large fish]: a fixed star of the first magnitude called also *a Piscis Australis*.

FOMENT, v. *fō-mĕnt′* [F. *fomenter*—from L. *fomentārĕ*, to foment: L. *fomentum*, an application to assuage pain—from *forĕō*, I warm, I cherish]: to bathe with warm liquids; to encourage or promote, as discord or discontent. FOMENT′ING, imp. FOMENT′ED, pp. FOMENTATION, n. *fō′-mĕn-tā′shŭn* [F]: the act of fomenting; application of warmth and moisture to a part of the body, usually by means of cloths wrung out of hot water, sometimes medicated with vegetable infusions of substances calculated to relieve pain or stimulate the surface, such as opium, belladonna, camomile, and turpentine. Fomentations are used in almost all painful local disorders. FOMENT′ER, n. one who foments.

FOMES, n. *fō′mēz*, FOMITES, n. plu. *fō′mĭ-tēz* [L. *fōmēs*, touchwood, fuel; *fōmĭtēs*, decayed wood, fuel]: porous substances capable of absorbing and retaining contagious matter, probably germs; woolen cloth and wood are said to be excellent 'fomites.'

FONBLANQUE, *fŏn-blăngk′*, ALBANY: 1797–1872, Oct. 14: journalist. He was intended for the bar, and became a pupil of Chitty, the eminent special pleader. Castlereagh's Six Acts made him a political writer. As editor of the *Examiner*, the leading liberal weekly journal, Fonblanque exhibited singular keenness of wit and intellect,

and exercised considerable influence on public opinion 1826–36. Leigh Hunt, his predecessor in the editorship of the *Examiner*, says of him in his Autobiography, 'He was the genuine successor, not of me, but of the Swifts and Addisons themselves; profuse of wit even beyond them, and superior in political knowledge.' The characteristics of his political writings may be gathered from his work entitled *England under Seven Administrations* (1837), a reprint of the more historical leading articles in the *Examiner* from the period of the Canning and Goderich ministries, to the return of the Melbourne ministry. Fonblanque's services to the whigs were rewarded by his appointment as sec. to the statistical dept. of the board of trade 1852. He afterward became head of the same dept., and comptroller of corn returns. See *Life and Labors of A. F.*, by his nephew (1874).

FOND, a. *fŏnd* [OE. *fonne*, to be foolish: Icel. *fani;* Sw. *fane*, a fool: Gael. *faoin*, vain, foolish; *fonn*, delight, pleasure]: foolishly attached to one; tender and loving; much pleased with; partial to; used in the sense of slightly foolish or silly: V. in *OE.*, to be in love with. FOND'ING, imp. FOND'ED, pp. FOND'LY, ad. *-lĭ*, in a fond manner; foolishly. FOND'NESS, n. tender interest; attachment; strong inclination; strong appetite. FONDLE, v. *fŏnd'l*, to caress; to treat with tenderness. FONDLING, imp. *fŏnd'lĭng:* N. a person or thing fondled or caressed. FONDLED, pp. *fŏnd'ld.*—SYN. of 'fondness': love; affection; kindness; foolishness; weakness; propensity; relish.

FOND DU LAC, *fŏn'dū lăk*, Fr. *fōng dü lâk* [Fr.]: the furthest inland extremity of any great body of fresh water. It has been adopted as a name of counties and towns adjacent to such waters in that portion of the United States which originally belonged to French Canada.

FOND DU LAC: city, cap. Fond du Lac co., Wis.; at mouth of Fond du Lac river, on Lake Winnebago; and on the Chicago, Milwaukee and St. Paul, the Chicago and Northwestern, and the Wisconsin Central railroads, 43 m. w. of Sheboygan; 63 m. n.n.w. of Milwaukee, and 148 m. n. by w. of Chicago. Engines, machinery, flour, lumber, leather, paper, carriages, farming implements, furniture, refrigerators, etc., are manufactured and a large agricultural and export trade carried on. Fond du Lac has waterworks, gas and electric lighting, fine public schools, libraries, and handsome parks, St. Agnes' hospital and sanitarium, and Grafton Hall girls' school. The assessed property valuation is nearly $4,500,000. Pop. (1900) 15,110; (1910) 18,797.

FONDI, *fŏn'dē* (anciently *Fundi*): small town of Italy, in the n.w. of the province of Caserta, six m. from the coast, on the Appian Way which now forms its principal street, 56 m. n.w. of Naples. It is an ill-built, dirty, and miserable town, in the neighborhood of a pestiferous lake (the ancient *Lacus Fundanus*); the surrounding plain, however, the ancient *Cæcubus Ager* (which produced

the famous Cæcuban wine of classic times), is very fruitful. Fondi is surrounded in part by walls of cyclopean structure and its inhabitants were long notorious for brigandage and lawlessness. Pop. 6,740.

FONDU, n. *fawng-dô* [F. *fondu*, pp. of *fondre*, to melt, to soften, to blend: L. *fundo*, I pour out]: style of calico paper-hangings in which the colors are in bands and blend into each other; in *cooking*, a light and pleasant preparation of cheese.

FONSECA, *fōn-sā'kâ:* bay on the Pacific coast of Central America, between the two states San Salvador and Nicaragua; notable principally as the proposed terminus of an interoceanic railway from the Puerto Caballos in Honduras. It is one of the largest bays in the South Pacific Ocean, and affords one of the finest harbors in the world.

FONT, n. *fŏnt*, or FOUNT, n. *fownt* [F. *fonte*, a melting, founding—from *fondre*, to cast: L. *fundĕrĕ*, to pour, to melt]: a complete assortment of types of one sort.

FONT, n. *fŏnt* [L. *fontĕm*, a font: It. *fonte:* F. *fonts*—from L. *fontēs*, fonts]: a baptismal basin. FONTAL, a. *fŏn'tăl*, pertaining to a fount or source.—Font (*Fons Baptismalis*) is the vessel used in churches as the repository of the baptismal water. In the early period, while immersion, or affusion (pouring water on the head), continued the ordinary rite of the administration of baptism, the baptistery (see BAPTISTERY), or other place set apart for the ceremony, was furnished with a basin sufficiently capacious for such administration, When sprinkling became the prevailing mode, the size of the basin was naturally diminished, and eventually it assumed the dimensions and the form now familiar. The font, in its normal form, consists of a basin or cup, more or less capacious, hollowed out of a solid block, and supported upon a stem or pedestal. It is ordinarily of stone, rarely of wood; some ancient examples of leaden fonts also occur and a few of copper or of bronze. In general the font in external form and character followed the prevailing style of ecclesiastical architecture and ornamentation. From its connection with one of the most solemn rites of religion, it became early a favorite subject for the decorative skill of the artist, and there are still in different English churches fonts which exhibit characteristics of all the successive fashions through which church architecture has passed since the introduction of the font in its present form. There is some doubt as to whether any existing specimen in England really belongs to the Saxon period, but examples are found of all later styles, from the Early Norman down to the latest revival of Gothic in our own day; the Early English, the Decorated, of which a beautiful example occurs in the Church of All Saints, Norwich; and the Perpendicular, seen in perfection at East Dereham in the same county of Norfolk.

The external figure of the basin seems to have been originally circular or elliptical; but most of the later fonts are hexagonal, or eight-sided. The basin was usually supported on a single pillar or stem. Many cases, however, occur in which it rests on three, four, or five pillars or, as in the engraving, on a group of pillars or pilasters united into a solid stem. The exterior, as well of the basin as of the pedestal, was often highly decorated, ordinarily with sculpture, occasionally in gold and colors; the designs on the basins commonly representing subjects connected with baptism, or its types and symbols. Frequently around the pedestal figures of the apostles are seen, sometimes only eleven in number, Judas being omitted.

In the Rom. Cath. Church, the service of Easter Saturday contains a solemn form for the blessing of the font. After a long series of prayers, and amid a very imposing ceremonial, the 'chrism', or consecrated oil blessed by the bishop and also the so-called 'oil of catechumens,' are mingled with the baptismal water, which is reserved for subsequent use. For the preservation of the water thus reserved, the font, especially when it is of porous stone, is sometimes lined with lead; and from an early date, it is furnished with a lid, which is secured by a lock, and is highly ornamented. The ordinary place of the font is at the w. end of the nave, near the entrance of the church, but in many cases it stands in a separate chapel or baptistery, or at least in a compartment screened off for the purpose. Even when it stands in an open nave, it is properly inclosed by a rail.

The baptismal font is not to be confounded with the 'holy-water fount,' which usually stands near the entrance of Rom. Cath. churches, and from which persons entering sprinkle their foreheads, in recognition of the inward purity requisite in entering the house of God; nor with the *piscina* or *sacrarium*, found in the chancel or the sacristy of ancient churches, and intended to receive and carry away the water used in cleansing the sacred vessels, the altar-linens, and the other furniture used in the administration of the eucharist.

FONTAINE, Jean de la: see La Fontaine, Jean de.

FONTAINE, Pierre François Léonard, *pēār frân-swâ lā-o-nar fôn-tān*, French architect and author: b. Pontoise, France, 1762, Sept. 20; d. Paris 1853, Oct. 10. He took the second grand prize of Rome 1785, going to Italy in 1786, and there connecting himself with Percier (q.v.), who, as director of the decorations of the opera, Paris, called him to his aid, a partnership then being formed which lasted till 1814, when Percier retired. They constructed a beautiful stairway in the Louvre; the Arc du Triomph du Carrousel; the arcades of the Rue de Rivoli as far as the Rue de l'Echelle. He retained the favor of Louis XVIII. and Louis Philippe, constructing the Galerie d'Orleans at the Palais-Royal, the Chapelle

Expiatoire, the Chapelle Ferdinand, repairs of the Louvre and the Tuileries, and the hospital at Pontoise. He wrote: *L'Histoire du Palais-Royal*; and, in collaboration with Percier, *Palais, maisons et autres edifices de Rome moderne* (1802); *Choix des plus celebres maisons de plaisance de Rome et ses environs* (1809–13); *Descriptions de ceremonies et de fêtes* (1807–10); *Recueil des decorations intérieures* (1812–17); *Residences des souverains* (183[illegible]).

FONTAINEBLEAU, *fōng-tān-blō:* town in France, dept. of Seine-et-Marne, beautifully situated in an extensive forest, near the left bank of the Seine, 35 m. s.e. of Paris, with which it is connected by steamers on the Seine, and by railway. There are several fine public buildings, among others, two hospitals—one erected by Anne of Austria, the other by Madame de Montespan. It furnishes much wine and fruit for the capital, and has manufactures of porcelain. Its grapes are famed as *Chasselas de Fontainebleau*. Pop. 14,160. Fontainebleau is famous for its château, or pleasure-palace of the kings of France, and the forest that surrounds it. The forest covers 64 sq. m., much fine scenery. The château, founded by Robert the Pious toward the end of the 10th c., was rebuilt in the 12th c. by Louis VII., of whom, and of Philippe Auguste, it was a favorite residence, and was enlarged by Louis IX. and his successors. After being allowed to fall into decay, it was repaired and embellished by Francis I., who here received the emperor Charles V. with lavish splendor, 1539. Almost every succeeding king added something in the way of enlargement or embellishment, so that it bears the character and style of almost every century. In the 17th c., it was the residence of Christina of Sweden after her abdication, and in the *Galerie des Cerfs* she caused her sec. Monaldeschi to be put to death for treason. Under Louis XIV. it was occupied by the Madame de Montespan, and under Louis XV. by Du Barry; and here Pope Pious VII. was detained a prisoner nearly two years by Napoleon. Many state transactions and treaties are dated from Fontainebleau; among others, the act of abdication of Napoleon, 1814. Louis Philippe had all the paintings renovated and the apartments restored in the taste of the 16th century.

FONTANA, *fŏn-tâ'nâ*, Domenico: 1543–1607; b. Mili, in the vicinity of Lake Como: engineer and architect. At the age of 20 he joined his brother, also an architect in Rome, and soon achieved a reputation sufficiently brilliant to attract the notice of the magnificent Cardinal Montalto, to whom he was appointed private architect. The pomp of this cardinal seems to have given umbrage to Pope Gregory XII., who in consequence, discontinued the cardinal's private pensions, and thus disabled him from completing the splendid works that he had intrusted to Fontana—viz., the Sistina Chapel in Santa Maria Maggiore, and an adjoining palace. In this emergency, the spirited architect, out of his own funds, carried on the noble designs of his patron, on

the same scale of magnificence in which they were commenced, and for his disinterested devotion received later ample reward, when the cardinal under the name of Sixtus V., was called to the papal chair. Fontana, as papal architect, was employed in a variety of important works, among which stands conspicuously the wonderful removal and re-erection of the colossal Egyptian obelisk, now in the piazza of St. Peter's. He afterward erected several other obelisks, and was intrusted by Sixtus with the construction of the Lateran Palace, and of the famous Vatican Library. The restoration of the columns of Trajan and Antoninus, and the construction of the aqueduct known as the *Aqua Felice*, are among the many works of utility executed by Fontana. On the death of friend and patron, Pope Sixtus, Fontana, through the intrigues of invidious enemies, was stripped of his post as papal architect 1592, but was immediately proffered a similar appointment in the name of the king of Naples. During his sojourn in Naples, he executed many imposing designs. His conception of a grander harbor was carried into effect by others after his death at Naples.

FONTA'NA, Felice: 1730–1803, Mar. 9; b. Pomarolo, in the Italian Tyrol; physiologist. He studied in the universities of Verona, Parma, Padua, and Bologna, and was presented to the chair of philosophy in the Univ. of Pisa. Afterward, as court physiologist, he organized a museum of natural history and physiology, with specimens and wax models, which to this day is one of the scientific marvels of Florence. A similar collection was executed by Fontana for the museum of Vienna, by order of Emperor Joseph II. Fontana's chief writings consist of scientific considerations on the various phenomena of physical irritability, *Richerche Filosofiche sopra la Fisica Animale* (Florence 1781), and *Dei Moti dell' Iride* (Lucca 1765).

FONTANA, *fon-tâ'nâ*, Lavina; portrait painter: 1552–1614; b. Bologna, Italy; daughter of Prospero Fontana (1512–97), a noted painter and instructor of the Caracci. She married an artist named Zappi, and was appointed painter to Pope Gregory XIII. She established a studio in Rome, frequented by the most eminent men and women of the day, and, unlike her father, painted with such extreme care and feeling that many of her works were subsequently attributed to Guido. Beside her portraits she painted historical, religious, and ideal subjects. Many of her works are preserved in the churches of Bologna. Her *Madonna, The Miracle of the Loaves*, and a *Holy Family*, have been highly praised.

FONTANE, Marius, *mâ-rîos fôn-tân*, French writer and administrator: b. Marseilles 1838, Sept. 4. He met Ferdinand de Lesseps in the Orient and became his secretary, shortly afterward being appointed chief of exploitation and secretary-general of the Suez Canal Company and later administrator and member of the Committee of Direction of the Panama Canal Company. He was im-

plicated with the other officers in the downfall of that company, was condemned in 1893 to two years' imprisonment, but this verdict was set aside on appeal, and after another trial he was acquitted. Among his works are: *Les Marchands de Femmes* (1863); *Confidences de la vingtieme annee* (1863); *Selim l'egorgeure* (1865); *Zara la rebelle* (1866); *La Guerre d'Amerique* (1866); *Le Canal maritime de Suez* (1869); *Essais de poesie vidique* (1876); *L'Histoire universelle* (Vol. I. 1881, Vol. X. 1899).

FONTANELS, n. *fŏn'tă-nĕls* [F. *fontanelle*, meeting of the seams of the skull—from *fontaine;* L. *fontĕm*, a fountain]: three or four membranous spaces left in the head of an infant where the frontal and occipital bones join the parietal, the chief one being at the crossing of the main sutures. About two years after birth it is usually closed by the extension of the bones adjacent. FONTIC'ULUS, n. *-tĭk'-ū-lŭs*, or FONTANEL, a small ulcer, artifically produced, for the discharge of humors from the body; it is easily induced by a hard substance kept for a time under the skin.

FONTANES, *fōng-tân'*, LOUIS, MARQUIS DE: 1757, Mar. 7—1821, Mar. 17; b. at Niort, of an old Prot. family of Languedoc. After the completion of his studies, he went to Paris, where he acquired a reputation by his poems, *Le Cri de mon Cœur* (Paris 1778), and *Le Verger* (Paris 1778), as also by his metrical translation of Pope's *Essay on Man*, and his imitation of Gray's *Elegy written in a Country Churchyard.* During the Revolution, Fontanes conducted various journals in the popular interest. In 1802, he was made a member, and in 1804 pres. of the legislative body. His admiration of Napoleon was great; and his splendid oratorical talents were often employed in eulogizing the emperor's acts. In 1810, he entered the senate. After the fall of Napoleon, he passed in the service of the restored Bourbons, and was raised to the peerage by Louis XVIII. His writings, prose and poetic, collected and edited by Sainte-Beuve (2 vols. Paris, 1837), are regarded as models of elegance and correctness.

FONTANGE, n. *fŏng-tângzh'* [named after Mlle. (afterward Duchesse) de *Fontange*, mistress of Louis XIV., introducer of the fashion]: head-dress worn by ladies at the beginning of the 18th c., a structure of wire which bore up the hair and the fore part of the lace cap to a great height.

FONTARABIA. See FUENTERRABIA.

FONTENELLE, *fŏn-tėh-nĕl'*, F. *fōngt-nĕl*, BERNARD LE BOVIER DE: 1657, Feb. 11—1757, Jan. 9; b. Rouen: French author. His father was an advocate, and his mother a sister of the great Corneille. He studied in the college of the Jesuits at Rouen; then for three years he professed to study law, but in reality busied himself with history, poetry, and philosophy. After passing as an advocate he commenced to practice, lost the first cause which he conducted, and renounced the bar. In 1674 he went to Paris, entered upon a literary career, and soon attained celebrity. He was a

member of several learned societies, and from 1699 to 1741 was sec. of the Académie des Sciences, but declined the post of president. Fontenelle died at Paris, having nearly finished his 100th year, wittily remarking to his friends, as he expired: *Je ne souffre pas, mes amis; mais je sens une certaine difficulté d'être* ('I don't suffer, my friends, but I feel a sort of difficulty in living any longer'). The greater part of his numerous writings in a great variety of departments, admired in their time, have fallen into oblivion, though his *Histoire du Théâtre Français jusqu'à Pierre Corneille* is still consulted. Fontenelle was celebrated for his *bonmots;* and for the manner in which he edited the *Mémoires de l'Académie des Sciences*, and executed his *Eloges*. At the age of 92 he still wrote madrigals. His *Œuvres Complètes* have been republished several times. The most complete edition is that published at Paris (5 vols., 1825).

FONTENOY, *fōng-tėh-nwâ':* village of Belgium, province of Hainaut, 5 m. s.w. of Tournay, notable as the scene of the battle of Fontenoy, 1745, May 11, one of the most famous in the war of the Austrian Succession. The opposing forces being the French, 60,000 strong, under Marshal Saxe and the allies (English, Dutch, and Austrians), in nearly equal force, under the Duke of Cumberland. After a hard fight, the allies were forced to retreat. The loss on both sides was stated at about 7,000 men. Pop. 800.

FONTEVRAULT, *fōnq-tėh-vrō'* (*Fons Ebraldi*): small town of France, dept. of Maine-et-Loire, 8 m. s.e. of Saumur. It owes its origin to a wealthy and celebrated abbey, now converted into a prison for 11 departments. This abbey was founded 1099 by Robert d'Arhrissel, a Breton monk, as the residence of a monastic society of penitents of both sexes. This society took the name of the *Order of Fontevrault.* It followed the austere rule of Benedict, but had this peculiarity, that the monks were ruled by an abbess, and not by an abbot. The order of Fontevrault soon spread through France, and into Spain, and in France especially acquired great riches. The abbesses of Fontevrault belonged, for the most part, to illustrious families, and were subject only to the popes. At a later period, the strictness of the monastic discipline was relaxed in favor of the nuns, whence, however, in the 14th c., sprang great disorders. Gradually, the order of Fontevrault fell into disrespect, but even at the outbreak of the French Revolution it possessed 57 priories in France, which were then abolished with the other monasteries. The town is of interest as containing the cemetery of several of the Plantagenet kings of England and of the counts of Anjou; though only the tombs of Henry II., of his queen Eleanor of Guienne, of Cœur-de-Lion, and of Isabelle, queen of John, have been preserved. The old monastic buildings and courtyards, surrounded by walls, and covering 40 to 50 acres, now form one of the larger prisons of France, in which about 2,000 men and boys are confined, and kept at industrial occupations. Pop. 2,500.

FOO-CHOO-FOO, or Foo-chow. See Fu-chow-foo.

FOOD.

FOOD, n. *fôd* [AS. *foda*, nourishment; Dut. *voeden*, to feed, to bring up; Goth. *fodjan*, to nourish: Gael. *fiadh*, meat, food]: whatever is eaten by animals for nourishment; victuals. FOOD'LESS, a. not affording food.—SYN. of 'food': diet; fare; aliment; nutriment; sustenance; meat; victuals; feed; provisions.

FOOD: as derived entirely from the vegetable and animal kingdoms.—Of animals used for food by man, the catalogue is very large. Savages, impelled by hunger, and unrestrained by any of those opposing considerations always powerful with civilized man, eagerly devour almost every animal on which they can lay their hands, vertebrate or invertebrate, whether in a fresh state or far gone in putrefaction.

There is no vertebrate animal of which the flesh is known to be poisonous or positively unwholesome, except some species of fish found chiefly in tropical seas. Of vertebrate animals, every class—Mammals, Birds, Reptiles, and Fishes—affords common and esteemed articles of food. Of mammals, those principally used for this purpose are the herbivorous quadrupeds, and, most of all, the ruminants, of some of which the milk also is much employed. The flesh of some of the pachyderms also is used, particularly the hog; and of some of the rodents, as the hare, rabbit, capybara, etc.—though the idea of eating others of the rodents, as mice and rats, would be rejected with disgust by nearly all civilized nations. The flesh of monkeys is eaten in some parts of the world, though a strong aversion to it is general in civilized lands, probably on the ground of the animal's resemblance to the human form; for travellers who have been compelled to eat monkey-flesh, declare it very good. The flesh of whales and other ordinary Cetacea is scarcely used except by rude tribes; though that of porpoises was formerly in great request in England, especially during Lent—the porpoise passing for a fish. The flesh of the herbivorous Cetacea, as the Manati and dugong of tropical seas, is esteemed. The flesh of some of the herbivorous marsupial quadrupeds, as the kangaroo, is eaten; but that of the carnivorous marsupials and of carnivorous quadrupeds generally is rejected.—The same general remark applies to birds: the flesh of birds of prey is rank, coarse, and unfit for human food; but that of almost all birds which feed on leaves, seeds, and other vegetable substances, or on insects, worms, mollusks, etc., is good for eating. Web-footed birds, particularly the *Anatidæ*, and gallinaceous birds (including pigeons), are more extensively used than any others; but birds of other orders are also eaten; and some of the small *Insessores*, as ortolans, beccfins, larks, etc., are brought to market as delicacies.—Of reptiles, one order—that of Ophidian reptiles, or serpents—affords food only to savages; but some of the Chelonian reptiles—turtles—are in high esteem; the Batrachian order contains the frogs which find a place

on the most luxurious tables: and to the Saurian order, or lizard-like reptiles, belong species—as the iguanas of S. America, creatures of uncouth appearance—which, however disgusting as food to Europeans in general, are esteemed by some a delicacy. The eggs of turtles and iguanas are used for food, as well as those of many kinds of birds. Of mammals, birds, and reptiles, the parts chiefly used for food are the muscles or flesh, and the fat; but other parts of some animals are used, as kidneys, lungs, livers, stomachs of ruminants (*tripe*), gizzards of birds, etc.—Very many kinds, both of cartilaginous and bony fishes are excellent for food, and they belong to many different families.

Of invertebrate animals, some mollusks are generally used, e.g. clams, oysters, mussels, and the snails of Italy. Comparatively few mollusks, however, form articles of human food. The same remark applies to crustaceans, though crabs, lobsters, cray-fish, prawns, and shrimps are well-known exceptions. It may almost be said that no articulated animals of any other class are used for food except by savages, the occasional use of locusts and of the larvæ of some coleopterous insects (gru-gru worms, etc.), scarcely requiring a qualification of the statement. And of the radiated animals, the same general statement may be made; the *Bêche-de-mer*, or *Trepang*—of which, however, the use is almost confined to the Chinese—being the only considerable exception.

Honey, though collected and modified by insects, is a product rather of the vegetable than of the animal kindgom. The same remark applies to a very different substance, the sea-weed gelatine of which certain swallows of the East India make their edible nests.

All the great divisions of the vegetable kingdom yield food for man—phanerogamous, however, much more largely than cryptogamous plants. Of the latter, the mosses and *hepaticæ* contain no species used for this purpose; the same almost may be said of lichens, notwithstanding the tripe-de-roche and Iceland moss; but numerous species of *Algæ* and of *Fungi* are edible: and a few ferns supply unimportant articles of food.

Of the phanerogamous plants, it is perhaps impossible to say whether the endogenous or the exogenous are most important in this respect, notwithstanding the place of the cereal grasses among the former. The plants yielding food are also distributed among many natural orders, though some orders, as *Graminea*, *Leguminosa*, and *Cruciferа* contain a large number of most useful species. The parts of the plants which yield food are the roots, tubers, bulbs, etc., of some; the stems of others; leaves, flowers, the fleshy part of fruits, and the seed. In the case of cereals man has appropriated as food what is really the starch store house, intended for starting the young plant. Sometimes the food selected is used uncooked; more frequently it is cooked. Sometimes other preparations are

necessary as cleaning and grinding. Except in the case of ferns, when the cryptogamous or acotyledonous plants are used for food the whole plant is used, as mushrooms, carrageen, Iceland moss. Sometimes the plant possesses a poisonous principle which must be separated from the food product by a suitable process as in the case of tapioca. Frequently a part of the plant is used as a source of food as the juice of the sugar cane and sugar beet.

The first place among articles of vegetable food must be assigned to *corn* or *grains* commonly called the cereals. The next place properly belongs to the potato and foods of that class, while the banana, manioc, and the different kinds of pulse are of great importance, especially in some tropical countries.

Regarded botanically the articles of food are: 1. *Roots*, properly so called, which include the turnip, carrot, beet, and some other esculent roots. The food value of these, however, is comparatively small and they are specially useful in furnishing variety to the food. Carrots contain 89 per cent. of water, parsnips 82 per cent. and turnips 92.8 per cent. 2. *Tubers*, of which the potato, yam and sweet potato are the most important, while the cassava or manioc, and other starch yielding plants are important. 3. *Rhizomes*, or root stocks, of which some are simply boiled, while others are valued, as arrow root, for the starch which they yield. 4. *Bulbs*, as those of the onion, garlic, etc. 5. *Stems*, which in some cases are eaten with the leaves, either boiled like vegetables or as salads. Some of the stems, however, as that of the sago palm yield valuable starch products. Asparagus, which belongs to this class, in the wild state was a Sea-shore plant. Celery, when in its wild state was known as smallage; by intense cultivation much of the disagreeable odor has been removed so that this plant has found great favor: Rhubarb (Rheum raphonticum) under name of pie-plant is a useful garden product. The stalks cooked with sugar are used on account of their flavor and acid which they contain. 6. *Leaves*, and leaf-buds as those of the kale and cabbage are often used. There are many other succulent vegetables whose leaves are utilized as spinach, water cress, beet tops, narrow leaf dock and lettuce. 7. *Flowers* and adjoining parts, as the cauliflower. 8. *Fruit* is used as a principal article of food, as in the case of the banana, or it is used as an article of luxury on account of its agreeable flavor and the vegetable acids which it contains. (See FRUIT.) 9. *Seeds*, especially those of the cereals (see CEREALIA) are of great importance. With these may be mentioned buckwheat, quinoa, the lotus of the Nile, and other water-lilies, many kinds of pulse, as peas, beans, lentils, kidney beans, etc., nuts of many kinds, some of which, as the chestnut and cocoanut, in some countries are very important foods. There are many seeds which are capable of being used occasionally as food, while there are others that have an occasional use as articles of luxury. Sugar, which is

placed among the most important articles of food, is obtained from the juice of the stem of the sugar cane, from palms, from the sap of the sugar maple and some other trees and from roots, especially that of the sugar beet. Alcoholic beverages are obtained from those substances which contain sugar or which contain starch. In the first instance the juice of the fruit as the grape, apple, etc., ferments, and the sugar is converted into carbon dioxid and alcohol. In the case of starch bearing substances, as corn, barley, rice, potato, etc., the starch is first changed into a kind of sugar, which subsequently, by the process of fermentation, breaks up in the same way into carbon dioxid and alcohol.

In addition to the important articles of food and beverages generally used, there are many condiments obtained from the vegetable kingdom, of which the botanical sources are extremely various such as mustard, pepper, ginger, cloves, etc., which are important as food accessories.

FOOD AND DRINK: food has been defined as 'anything, which, when taken into the body, is capable of repairing its waste, or furnishing it with the material from which to produce heat and nervous and muscular work.' It is important to distinguish between food and medicine, and to notice that the latter may revive some vital action but will not supply the material which sustains that action. Many of the food accessories, such as spices and condiments, and such articles of diet as tea and coffee, could hardly be regarded as foods, but they are often useful to stimulate the appetite and make the food more agreeable. It is not essential that a single food should contain all the nutrients needed by the body. A variety of food, however, to stimulate the appetite and vary the character of the work that the organs of digestion are called upon to perform, is always advisable. Some foods furnish nearly all the nutritious substances needed by the body, while others supply material in economical or agreeable forms.

The knowledge that man has obtained as to which food is wholesome and which is poisonous is largely the result of experience and this experience was transmitted and grew from one generation to the next. In early ages the variety of food was not as great as now, for people not only had less skill in preparing and less experience in selecting the food, but they were obliged to depend on the chase, or to use only that food which was obtained in the immediate vicinity of their dwellings. They were not able to draw on all climates nor to preserve fruits from one season to another. A mixed diet may be considered as an evidence of advanced civilization, and there is no doubt that man as well as lower animals is benefited by a variety of food. It has been stated that: 'Digestion experiments made with any kind of food material does not give on the whole as valuable results as those in which two or more food materials are used. In other words it appears that with a mixed diet the same person will digest

a larger portion of nutriment than with a diet composed of a single food material.' Although there are about 75 elements recognized by the chemist, in the body we find only the following elements: oxygen, carbon, hydrogen, nitrogen, phosphorus, sulfur, chlorin, fluorin, silicon, calcium, potassium, sodium, magnesium, iron, manganese and copper—16 in all.

Before considering the proximate principles it will be interesting to study the source of each element that is found in the body. Carbon, hydrogen, nitrogen, and oxygen are partially supplied by the albuminous group of alimentary substances. (See DIET.) Albumin, fibrin and casein come from both vegetable and animal sources, and gluten is contained in vegetables. The flesh of animals, eggs, milk, the cereals and other vegetable products contain one or more of these principles. Carbon, hydrogen and oxygen are abundantly introduced into the system in sugar, starch and organic acids. The principal sources of the starch are the cereal grains, peas and beans, roots and tubers. The organic acids are obtained specially from fruit and vegetables. Carbon, hydrogen and oxygen also occur in fatty substances such as suet, butter, olive oil, nuts and some fish. Phosphorous may come from the flesh, blood, fish, and also in small quantities from the vegetables that are used as food. The system derives its sulfur from the fibrin of flesh, the albumin of eggs, the casein of milk, from the vegetable fibrin of grain and also from vegetable albumin of turnips, cauliflower, asparagras, etc.

The vegetable casein of peas and beans should not be overlooked as a source of sulfur. Chlorin and sodium in the form of sodium chloride, or common salt, are present in animal food, and salt, of course, is used as a condiment.

Potassium is a constituent of both animal and vegetable food. It is found in milk, in the juices of the flesh, and in the ashes of plants.

Calcium, which is so abundant in the body, may come from flesh, bones, eggs, milk, and vegetables. Ordinary drinking water is also a source of calcium as it usually contains considerable calcium bicarbonate and calcium sulfate. Magnesium in small quantities is generally found associated in foods with calcium. Iron is a constituent of blood. It is also found in milk, in the yolk of eggs, and in most of the vegetable foods. Fluorine in small quantities is found in some vegetables.

The fact that these elements are present, means, however, very little if we have no information to how they are combined into proximate substances or compounds that form in the body; for the elements just discussed might be combined to form innumerable substances.

We actually find that these elements that have been taken into the body with the food have been converted into such substances as water, albumin, myosin, fat, ossein, which is found in the bones, creatin, which is found in the skin, nails and hair, cartilagon, found in cartilages.

hemoglobin found in the blood, neurin, lecithin, cerebrin, found in the brain, nerves, etc., and cholesterin, inosite, glycogen, found in the brain, muscle and liver.

In addition to these calcium phosphate is found in the bones and teeth, water is found in all the tissues, calcium carbonate in bones, calcium fluoride and magnesium phosphate in the bones and teeth, sodium sulfate, phosphate and carbonate, and sodium chlorid distributed through the different tissues, while silicon is found specially in the hair.

It is evident that either in the animal or vegetable kingdom the food of man must be built up or organized so that it will be in a condition to sustain life when taken into the system. The number of elements which enter into each one of the proximate principles already mentioned is not very large, for instance, in water we have only two, hydrogen and oxygen, in sugar, starch, fat and organic acids we find only carbon, hydrogen and oxygen. Casein contains five elements, and fibrin and albumin, six. See DIET.

The beverages may some of them be classified as liquid foods; but these are usually taken because they are agreeable to the system, or like water they simply quench thirst. The ordinary beverages may be divided into the non-alcoholic and alcoholic.

Under the head of non-alcoholic beverages may be mentioned, (1) Mucilaginous, and farinaceous drinks, such as toast-water, barley-water, etc., which are of little nutritive value. (2) Acidulous drinks, such as lemonade, raspberry vinegar, etc., which allay thirst both by the acid which they contain and by the water. Some of these have cooling antiscorbutic effects. (3) Emulsive or milky drinks, as animal milk, and that of the cocoanut. The former is, of course, a highly nutritive food. (4) Stimulating beverages, such as tea, coffee, chocolate, and cocoa. (5) Alcoholic beverages which may be divided into four classes: (*a*) Fermented liquors: as wine, cider, berry; wine from fruits, berries, etc.; palm wine called 'toddy' in India; bouza, made in Tartary and the East from millet seed; honey wine, used in Abyssinia; koumiss, made from mare's milk in Tartary; fig wine made in the vicinity of the Mediterranean Sea; and pulke, made by the Mexicans from the juice of the century plant. (*b*) Malt liquors: as lager beer, ale, porter, stout; kvass, made in Russia from rye; chica made in South America from corn, rice, etc.; saké, made in Japan from rice; and pombe, made in Africa from rice. (*c*) Distilled liquors; as alcohol, whiskey, brandy, gin, and rum, and vodka made from grains in Russia, arrack made from rice and palm juice in India, mescal made by the Mexicans by distillation of pulke mentioned above, and cherry brandy, or 'Kirsch-wasser,' as it is termed in Germany. (*d*) Liqueurs and cordials as absinth and vermuth.

The stimulating beverages possess qualities in common for which they are universally esteemed by mankind. First, they retard retrograde metamorphosis of the body

tissues, and this enables the work of the individual to be done upon a small supply of food material and with less fatigue. Second, when used in moderation they are more or less stimulating to the mental powers. Third, they act as sedatives to the nervous system. The similarity of the action of these beverages is due to the possession of common constituents. While there are divergencies from each other in a general way, their different values depend upon the aromatic and volatile oil, which modifies the action of the alkaloid. It is an interesting fact that similar properties are developed in each of them by drying and roasting. (See STIMULATING BEVERAGES.)

The question of the physiological action of alcoholic beverages has given rise to a vast amount of discussion. The best authorities seem to agree that there are cases of disease in which it is the most useful material that can be administered. As a stimulant alcohol acts purely upon the nervous system and circulation, quickens the transmission and enhances the effect of nerve currents. Although alcohol tends to remove muscular fatigue it is absolutely forbidden to athletes in training, and soldiers in the army continue in better health if they abstain from the use of this substance. See ALCOHOLIC LIQUORS.

As to the condiments or seasoning agents taken with foods to improve their flavor—excluding salt, which must be considered as a saline alimentary principle—the most common condiments, such as mustard, capsicum (Cayenne pepper), pepper, the various spices, etc., owe their action to the presence of a volatile oil. Sauces are usually fluid mixtures of these condiments with alimentary substances. To one in health, condiments and sauces afford little or no nutrition; and though for a time they may stimulate a debilitated stomach to increased action, their continual use never fails to induce a subsequent increased weakness of that organ. Salt and vinegar are the only exceptions: these used in moderation, assist in digestion; vinegar, by rendering muscular fibre more fluid; and both together, by producing, as some believe, a fluid having some analogy to the gastric juice. For the cookery of foods see BOILING, BROILING, COOKERY, DIET, etc.

The following are general considerations:

Food, in order to be agreeable and wholesome, is usually cooked. There are a few exceptions such as dried or 'jerked' beef, oysters and ripe fruit. In salting, pickling, and smoking the animal textures are hardened and certain chemical changes may be induced, which render the food less nutritious. Food is cooked, first to improve its appearance and make it more agreeable to the eye, and thus more appetizing. Second, because warm food is usually found more agreeable than cold. Third, to improve the flavor and odor, particularly in the case of meats. Fourth, in order to destroy any parasites or micro-organisms that may be contained in the food. Fifth, to bring about certain chemical changes in the food; and to soften the material so that it may be more readily acted upon by

digestive fluids. When proteids, such as meat or eggs, are acted upon by heat, even if the temperature is not above 170° F., they are coagulated and made more solid, but they are not so tough, and the bundles of fibers can more easily be torn apart.

In the cooking of starchy foods such as cereals the granules swell up, the outer envelope bursts, and thus after mastication the digestive ferments have an opportunity to come more intimately in contact with the starch.

The ordinary operations of cookery are boiling, broiling, roasting, baking, stewing and frying.

Boiling, in the case of vegetables, affects the solution of gummy and saccharine materials, the rupture and possibly partial solution of starch grains, the coagulation of albuminous substances, and to some extent the expulsion of volatile oils.

It is an interesting fact that while vegetable foods take up water when they are boiled animal foods actually lose water. According to recent investigations the average amount of water in 14 samples of uncooked meat was 70.08 per cent., while in 31 samples cooked in hot water it was only 57.5 per cent.

In boiling flesh there takes place more or less separation of the soluble from the insoluble constituents according to the temperature at which the operation begins, the amount of water employed and the length of time during which the operation is carried on. If an extract is required the meat should be placed in cold water and kept at a temperature below 160° F. for several hours with the addition of a little salt. This is the method for extracting nutritious material for making soup. Recent experiments show that there is not much difference in the composition of meats immersed in cold water and then cooked at 85° C. and those plunged at once into boiling water and cooked at a temperature of 85° C. If we desire to retain the rich juices the meat must be heated as quickly as possible on the outside so as to prevent the escape of these juices with their accompanying flavors. (See Bul. 162, U. S. Dep't. of Agric. Experiment Station.)

The greater part of the proteids, both animal and vegetable, are coagulated at about 170° F. Fats are not as much affected by heat as carbohydrates and proteids, although when heated to high temperatures they are liable to be partially decomposed. The average loss in weight when meat is cooked in hot water is about 34 per cent.

Roasting is applied much more to meat than to vegetables. Both in roasting and boiling the first application of heat should be at a high temperature so as to form an outer coating of coagulated albumin. The process of 'basting' assists in sealing up the tubes so that the nutritive juices may be retained. In roasting meat nothing is removed but some of the superficial fat which is frequently utilized in the form of gravy.

The effect of roasting on such vegetables as apples and potatoes is to render them more nutritive and digestible

than they would be in the raw state, partly by cooking the starch, and partly by rendering their constituents more soluble.

Baking acts in the same manner as roasting although if the meat is cooked in a closed oven the products of decomposition produced by the high temperature are liable to impart a disagreeable flavor to the meat.

Meat is more satisfactorily cooked by broiling or grilling, because the heat that is at first applied is more intense and later the meat has an opportunity to cook in the interior so that the flavor is superior and the agreeable extractives are largely retained.

In stewing or preparing what is commonly called a 'pot roast,' as the heat is low and long continued, and as the juices extracted are all served with the meat, the process is very satisfactory. If the temperature is not allowed to rise above 180° F. the meat will fall apart readily, and the proteids will be only slightly coagulated.

Frying is the most objectionable of all kinds of cookery, because in this operation the heat is usually applied by the use of boiling fat or oil. If the temperature is not very high considerable of this fat is taken into the material fried, and the product becomes tough and not readily disintegrated in the process of digestion. There are also liable to be various products of decomposition of the fats set free, which are obnoxious to the stomach of invalids.

Many years ago Liebig showed that salt meat is much the same as meat from which soup has been made as far as its nutritious qualities are concerned. The brine when examined chemically will be found to contain a large quantity of albumin, phosphate, lactic acid, potash, creatin, and creatinine, all of which are essential nutritive substances, and which, if removed from the meat, of course, reduce its food value.

FOOD, ADULTERATION OF: In the United States the federal law and most of the state laws are directed against foods which are adulterated, or misbranded, or which contain poisonous or deleterious substances. The National Pure Food Bill of 1906, June 30, has been supplemented by Pure Food Laws in most of the states, where such laws did not previously exist on the statute books. Most of the common adulterants of foods are as follows:

Wheat flour is not usually adulterated with foreign substances as has sometimes been stated, but it does sometimes contain inferior grades. A recent form of adulteration is bleaching by an electric process so as to make a low grade of flour appear whiter.

Arrow root is liable to be adulterated with potato or corn starch, but these adulterants can be readily detected by the use of the microscope. Other foods of this class such as *sago* and *tapioca* may be adulterated in the same way.

Sugar is usually pure though it has often been artificially blued so as to make a yellow sugar look white.

Jams and *jellies* are adulterated if made from other

ingredients than fruit and sugar. They are often made up of 'stock,' which consists of a low grade of apple pulp, colored with coal tar dyes, preserved with sodium sulphite or sodium benzoate, and sweetened with glucose.

Ground spices are adulterated with ground crackers, hard tack, cocoanut shells, olive pits, linseed meal, and sometimes with mineral substances. They are artificially colored with turmeric and burnt sugar products.

Tea as imported into the United States is usually pure, but low grades of tea may be substituted for high grades, in the hands of the dealer.

Ground coffee is largely adulterated with chicory and roasted grains, roots, acorns, burnt sugar, and similar substances. Coffee grains have been adulterated by mixing with them artificial grains, made up of chicory and starch, moulded so as to resemble coffee berries.

Cocoa and *chocolate* are adulterated with flour, potato-starch, sugar. Sometimes mineral substances are used as an adulterant for chocolate. Cocoa butter is sometimes removed and suet is substituted.

Vinegar is not so frequently adulterated as misbranded. The so-called 'white wine vinegar' is often nothing but a spirit or distilled vinegar. The so-called 'cider vinegar' is of similar origin, colored with burnt sugar and possibly flavored with a little genuine cider vinegar. Acetic acid known as 'wood vinegar' is sometimes used as adulterant, but the use of sulphuric acid is not common.

Pickles are adulterated by the addition of copper to give them a green color, and they may be hardened by the use of alum. *Canned peas* and *string beans* are often colored by the use of copper sulphate. *Canned corn* has been adulterated by the addition of sugar, and recently by the addition of saccharin. Many canned fruits are put up in glucose syrup instead of cane sugar, and in some cases preservatives have been used.

Tomato catsup is sometimes made from pumpkin 'stock,' to which is added some refuse tomatoes, artificial coloring matter and a chemical preservative, besides the ordinary flavoring ingredients.

Maple syrup is frequently an imitation made from cane sugar, colored with burnt sugar, and flavored by the use of an extract made from walnut bark, maple bark, etc.

Extract of lemon frequently contains only an extremely small quantity of oil of lemon and is artificially colored with aniline yellow and contains only one-third of the required amount of alcohol.

Extract of vanilla is frequently made from a tonka bean and sometimes contains artificial vanillin and coumarin.

Ice cream is frequently below the standard of 14 per cent. of butter fat, and sometimes contains gelatin as a thickening material.

Olive oil is frequently adulterated with cottonseed oil.

Most of the *canned meat* products are reasonably pure, especially since the passing of the law.

Fresh meat has been very commonly preserved and improved in appearance by the use of sodium sulphite.

Wines, beer and *liquors* are adulterated as mentioned under the various titles.

The most common adulterant for *milk* is water and a preservative, such as formaldehyde or borax, and sometimes sodium carbonate is used to neutralize the acidity.

In recent legislation special attention has been paid to 'misbranding' food products and when foods are below standard grade, or if they are artificially colored or preserved, these facts must be stated on the label. See Leach, *Food Inspection and Analysis* (1904); Wiley's *Foods and Other Adulterants* (1907); Bulletins of U. S. Department of Agriculture.

FOOD, PRESERVATION OF: It is only within the last 50 years that great advances have been made in the preservation of food. Formerly, fruits, vegetables, and meats must be consumed in the locality where grown. By the use of modern methods of preservation the season for the use of each fruit has been extended; and the product of one climate can be transported to another climate for consumption. Since the fermentative changes that take place when food is kept for some time are due to the growth of various micro-organisms, any process which will prevent this growth or keep these organisms out of the food will assist in its preservation. Warmth, moisture, and access of germ-laden air are conditions favorable for the decomposition of food.

Some of the methods adopted for the preservation of food are: (1) maintaining a low temperature; (2) drying so as to remove as much moisture as possible; (3) addition of sugar or glucose; (4) the use of saltpeter or brine; (5) pickling with vinegar; (6) canning or placing in a sterilized atmosphere; (7) the use of chemical preservatives.

Cold storage has been introduced not only for transportation, but also for preservation so that meats, fruits and other perishable products can be kept till a favorable opportunity comes for disposing of them.

In drying fruit sulphites have been used extensively, particularly for bleaching purposes. When sugar is used in preserving, a sufficiently thick syrup is prepared so that there shall be no opportunity for fermentation to take place.

The action of saltpeter and brine has already been referred to as producing considerable deterioration in the product thus preserved. In all these cases the conditions are unfavorable to a growth of micro-organisms and so decay is prevented.

The process of preservation by canning or protecting from germ-laden air has been developed to an enormous extent within the last 25 years. At the present time in many localities quite a large proportion of the food actually used has been canned or 'tinned' and fortunately most of this food thus prepared is of such quality as to be whole-

some. In the process of canning it is only necessary to thoroughly cook the material as in the case of fruit and put it in sterilized cans, sealing immedialety to prevent the subsequent access of air.

In the canning factories the method in general is to heat the material in tin cans with required amount of water or steam under pressure, or in some cases to cook in a bath with some salt so that the temperature can be raised above that of boiling water. The cans are then punctured to allow the excess of air to escape, again sealed with a drop of solder, and again heated to destroy all micro-organisms.

A modern method of canning is to cook the fruit at a temperature a little below the boiling point and after transferring to the cans and sealing, to heat at a temperature of about 125 C. in dry air retorts in order to sterilize.

In recent years the practice of adding preservatives to foods has greatly increased. This preserves the food by inhibiting the growth of bacteria. There is still a difference of opinion as to the wholesomeness of food prepared by the use of some of these preservatives. In many states, however, a definite amount of such preservatives as sodium benzoate, salicilic acid or borax is allowed. The use of such preservatives as formaldehyde, which has sometimes been added to milk, is usually absolutely prohibited on the ground that it may produce injurious results, and a product that may be used as food for invalids and infants should be absolutely free from any deleterious substance. The use of sulphites is common, but in the United States is almost universally forbidden.

FOOL, n. *fôl* [F. *fol*—from mid. L. *follus*, one who grimaces—from L. *follis*, a pair of bellows, in mid. L. a grimace: W. *ffol*, foolish, vain: OF. *folier*, to err or wander (see FOLLY)]: one who acts absurdly or unwisely: a person who is void of reason or understanding; a person of a weak intellect; a jester (see COURT-FOOL): V. to treat with contempt; to disappoint; to cheat; to trifle; to toy. FOOL'ING, imp.: act of playing the fool. FOOLED, pp. *fôld*, deceived; imposed on. FOOL'ISH, a. absurd; marked with folly; silly; indiscreet. FOOL'ISHLY, ad. *-lĭ*, weakly; without understanding. FOOLISHNESS, n. want of wisdom or judgment. FOOL'ERY, n. *-ėr-ī*, FOOL'ERIES, n. plu. *-ĭz*, habitual folly; that which is foolish; attention to trifles. FOOLHARDY, a. *-hâr'dĭ*, daring without judgment; madly rash; headlong. FOOLHAR'DINESS, n. FOOL'S-CAP, or FOOLSCAP, n. a long folio writing or printing paper, so called from being marked with a fool's cap and head. FOOL'S ERRAND, the pursuit of that which cannot be found; an impossible enterprise. TO PLAY THE FOOL, to behave like one devoid of understanding. TO MAKE A FOOL OF, to cause to appear ridiculous. FOOL'S PARADISE, the state or condition of mind into which one is brought to believe highly improbable and absurd things to their own advantage, and to the gratification of their vanity. TO FOOL ONE OF HIS MONEY, to cheat.—SYN.

of 'foolish': irrational; preposterous; shallow; brainless; imprudent; unwise; simple; ridiculous; trifling; vain; incautious; sinful; wicked; contemptible; despicable.

FOOL OF QUALITY, The: a curious novel by Henry Brooke, published originally in five volumes (1760–77). It was considered of such spiritual value by John Wesley, the founder of Methodism, that he prepared a special edition of it for the use of his followers. Toward the close of the book its mysticism becomes exceedingly exalted and visionary, suggesting the author's acquaintance with the teachings of the German mystic, Jacob Boehme. The work as a whole is hardly capable of holding a modern reader's interest. It had, however, no mean place in the popular fiction of the 18th century.

FOOLAHS, or Fellatah. See Fulahs.

FOOL'S ERRAND, A: a story by Albion W. Tourgee, published in 1879. It is the first of a series dealing mainly with events connected with the Civil War. 'The Fool' is Comfort Servosse, a Union colonel, who removes from Michigan to a southern plantation after peace is declared. The story of his reception there and the difficulties encountered, arising out of old prejudices upon the one hand and his own training and convictions upon the other, is told with much detail and strong local coloring.

FOOLS, Feast of: a pagan festival of absurdity, perpetuated in many Christian countries for a long period. The Romans kept the festival of Saturn, in Dec., as a time of general license and revelry. During the brief season of the Saturnalia (q.v.), the slave reclined on his master's seat at table, the master waited upon his slave, and society, for the moment, seemed turned upside down. The grotesque masquerade survived the pagan creed which gave it birth, and not only kept its place among the Christians, but in the face of solemn anathemas of fathers and councils, even found its way into the ceremonial of the Christian Church. It was called, at different times and places, by many different names, but has latterly come to be known as the Feast of Fools (*Festum Fatuorum, Festum Stultorum*).

The circumstances of the observance were almost infinitely varied, but it was everywhere marked by the same spirit of broad boisterous drollery, and coarse but not ill-natured caricature. The donkey played such a frequent part in the pageant that it was often called the Feast of Asses (*Festum Asinorum*). In some places, the ass of Balaam was figured; in others, the ass which stood beside the manger in which the infant Savior was laid; elsewhere, the ass on which the Virgin and Child fled to Egypt, or the ass on which Jesus rode into Jerusalem. In every instance, there was more or less attempt at dramatic representation, the theatre being generally the chief church of the place, and the words and action of the drama being often ordered by its book of ceremonies. Several rituals of this sort are still preserved. That which was in use at Beauvais, in France, has a rubric ordering the priest when he dismisses the congregation to bray three times, and ordering the

people to bray three times in answer. As the ass was led toward the altar, he was greeted with a hymn of nine stanzas, of which the first runs thus:

Orientis partibus,
Adventavit Asinus.
Pulcher et fortissimus,
Sarcinis aptissimus,
Hé, sire Ane, hé!

[From the regions of the East—
Blessings on the bonny beast!—
Came the donkey, stout and strong,
With our packs to pace along.
Bray, Sir Donkey, Bray!]

Where the ass did not come upon the stage, the chief point of the farce lay in the election of a mock pope, patriarch, cardinal, archbishop, bishop, or abbot. These mimic dignitaries took such titles as 'Pope of Fools,' 'Archbishop of Dolts,' 'Cardinal of Numskulls,' 'Boy Bishop,' 'Patriarch of Sots,' 'Abbot of Unreason,' and the like. On the day of their election, they often took possession of the churches, and even occasionally travestied the performance of the church's highest office, the mass, in the church's holiest place, the altar. In some convents, the nuns disguised themselves in men's clothes, chanted mock services, and elected a 'little abbess,' who for that day took the place of the real abbess.—The Feast of Fools maintained itself in many places till the Reformation in the 16th c. At Antibes, in the s. of France, it survived till 1644, when we have it described by an eye-witness in a letter to the philosopher Gassendi. The scene was, as usual, a church; the actors, dressing themselves in priests' robes turned inside out, read prayers from books turned upside down, through spectacles of orange-peel, using coal or flour for incense, amid a babblement of confused cries, and the mimic bellowings of cattle, and grunting of pigs.—The history of the Feast of Fools has been treated in several works; the best is the *Mémoire pour servir à l'Histoire de la Fête des Fous,* by Du Tilliot (Lausanne 1741; reprinted Paris 1751 and again in the *Recueil des Cérémonies et Coutumes Religieuses de Tous les Peuples,* tome VIII. edit. Prudhomme, 1809).

FOOL'S PARS'LEY (*Æthusa Cynapium*): umbelliferous plant, very common as a weed in gardens and fields in most parts of Europe, somewhat resembling parsley in its foliage and general appearance, so that serious accidents have occurred from its being mistaken for that herb; as it is a poisonous plant with properties somewhat resembling hemlock. With the curled variety of parsley, which is the preferable variety on all accounts, it cannot easily be confounded; and when in flower it may be known by its umbels wanting general involucres, and having partial involucres of three slender leaves hanging down on one side.

FOOT, n. *fût,* Feet, n. plu. *fēt* [Dut. *voet;* Icel. *fotr;* Dan. *fod;* Goth. *fotus;* Ger. *fuss,* a foot: Gr. *podĕs;* L. *pĕdēs,* feet]: the lower part, base, or bottom of anything;

that on which any animal or thing stands; infantry soldiers; a lineal measure of 12 inches; a step or pace; in *poetry*, the division of a line (see METRE: VERSE); in *music*, term denoting, as in poetry, a short melodic figure of notes with only one accent. Foot is beginning to be used in speaking of the pitch of sounds. The Germans have always used the word *Fusston* in representing the pitch of the different stops of an organ, such as *Principal* 16 F., 8 F., or 4 F., etc., which convenient practice has been introduced into English organs. The pitch of the stop is fixed according to the length of the lowest C pipe (see ORGAN). FOOT, v. to kick; to tread; to dance; to trip to music; in *OE.*, to settle; to tread; to hold with the foot. FOOT'ING, imp.: N. a hold for the feet; a firm foundation; status or position; tread; walk; dance; entrance; support. FOOT'ED, pp. FOOT'LESS, a. without feet. FOOTS, n. plu. the settlings of oil, sugar, etc., at the bottom of a barrel. FOOTBALL, a large ball for kicking. FOOT-BOARD, any support for the feet; the upright board at the foot of a bed. FOOTBOY, a boy who attends in livery. FOOT GUARDS, n. plu. the flower of the British infantry, the garrison ordinarily of the metropolis, comprising three regiments, the Grenadier, Coldstream, and Scots Guards, in all seven battalions, about 6,000 officers and men (see GUARDS). FOOTHOLD, space on which the foot may rest or tread securely. FOOTFALL, a setting down of the feet. FOOT-LIGHTS, the row of lights in the front of the stage of a theatre, and nearly on a level with it. FOOTMAN, a servant in livery; in *OE.*, a soldier who fights on foot. FOOTMARK, a mark or track made by the foot. FOOTNOTE, a note of reference at the foot of a page. FOOT-PACE, a slow step. FOOTPAD, a highwayman on foot. FOOT-PLATE, the platform on which the engineman and fireman of a locomotive stand while attending to their duties. FOOTPATH, a road for persons on foot. FOOT-PRINT, in *nat. science* (see ICHNOLOGY). FOOT-ROT, ulcer in the feet of sheep. FOOT-SOLDIER, one who fights on foot, the opposite of *horse-soldier*. FOOTSORE, a. sore and worn at the feet. FOOT-STALK, the stalk of a leaf, or of a flower. FOOT-STEP, space traversed by a single step in walking; the putting down of the foot in walking; sometimes, a trace; impression left by a foot (see FOOT-PRINT). FOOTSTOOL, that which supports the feet of one sitting. FOOT-VALVE, the valve in the passage between the condenser and the air-pump of an engine. AFOOT, ad. stirring; taking action; in train. ON FOOT, walking; the act of walking; in motion; action. TO FOOT IT, to engage in the dance. TO SET ON FOOT, to originate; to set in motion. ON THAT FOOTING, on these grounds; on that basis. BEST FOOT FOREMOST, use all possible care by the exercise of your best powers. GOOD FOOTING, standing well with. TO PAY YOUR FOOTING, among workmen, drink-money given in some shops by a new-comer or entrant. TO PUT ONE'S FOOT INTO, to blunder into an unpleasant predicament; to interfere with vexatiously, officiously, or impertinently. TO FOOT THE BILL, to pay an account.

FOOT: member of the human or animal body used in standing, locomotion, etc. The *bones* of the foot in man, number 26, arranged in three natural groups—viz., the tarsal bones, which are the hindermost; the metatarsal bones, which occupy the middle portion; and the phalanges of the toes anteriorly. The tarsal bones, seven in number, are short and thick, and form the heel and the hinder part of the instep. The uppermost (see Fig. 1) is called the *astragalus*, from its supposed resemblance to the dice used by the Romans. Above, it is articulated or jointed with the two bones of the leg, the *tibia* and *fibula*, and through these bones the whole weight of the body is thrown upon the two *astragali*. Behind, it is connected with and rests upon the *calcaneum os calcis*, or heel-bone,

Fig. 1.

The dorsal surface of the left foot:

1, the astragalus, its upper articular surface; 2, its anterior extremity, which articulates with (4) the scaphoid bone; 3, the os calcis, or heel-bone; 4, the scaphoid bone; 5, the internal cuneiform bone; 6, the middle cuneiform bone; 7, the external cuneiform bone; 8, the cuboid bone; 9, the metatarsal bones of the first and second toes; 10, 11, the first and second phalanges of the great toe; 12, 13, 14, the first, second, and third phalanges of the second toe.

the largest bone of the foot. Immediately in front of it, and supporting it in this direction, is the *scaphoid* or boat-shaped bone. In front of the scaphoid bone are the three *cuneiform* or wedge-bones; and on the outer side of the cuneiform bones and in front of the os calcis, is the *cuboid* bone. We see from the figure that the front row of tarsal bones is composed of the three cuneiform bones on the

inner side of the foot and of the cuboid bone externally. There are five metatarsal bones passing forward, one for each toe. Each cuneiform bone is connected with one, and the cuboid bone with two, of these metatarsal bones. Behind, they are close together, but in taking their forward direction, they diverge slightly from one another, and their anterior ends rest upon the ground, and form the *balls* of the toes. They constitute the forepart of the instep. The remaining bones are those of the toes, and are named the *phalanges*, each toe having three of these bones, excepting the great toe, which has only two. (A similar law holds for the bones of the hand, each finger having three phalanges, but the thumb only two.)

The instep is composed of the seven tarsal and the five metatarsal bones, so arranged and connected (see Fig. 2) as to form an arch from the extremity of the heel-bone to the balls of the toes. This is called the plantar arch, from *planta*, the sole of the foot. The astragalus forms the summit or keystone of this arch, and transmits the weight which it receives posteriorly to the heel, and anteriorly to

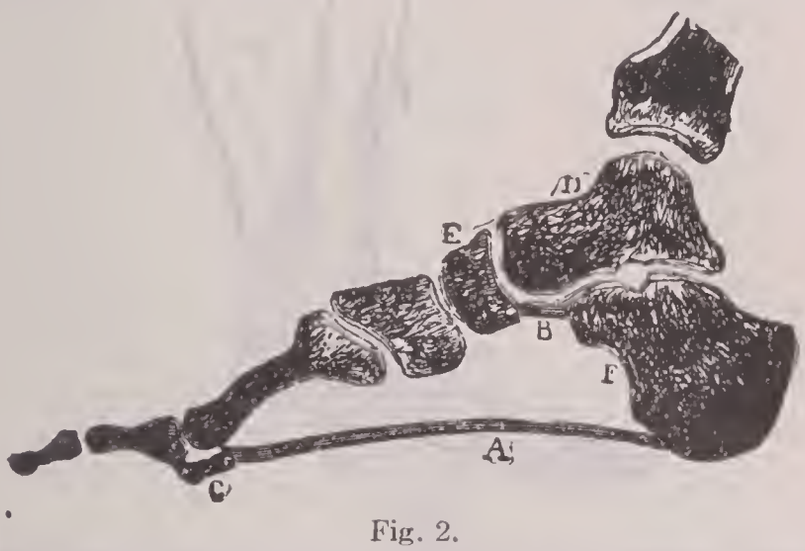


Fig. 2.

This figure represents a section through the lower end of the tibia, and through the astragalus D, the heel-bone F, the scaphoid bone E, the internal cuneiform bone, and the bones of the great toe; A represents the plantar ligament, and B the interior calcaneo-scaphoid ligament passing from the heel-bone, F, to the scaphoid, E; C is one of two small bones called sesamoid bones, usually found at the ball of the great toe. The lines show the disposition of the laminæ or plates of which the various bones are composed. The clear line along the contiguous edges of the bones represents the cartilage.

the balls of the toes. This figure exhibits the arrangement of the fibres and laminæ in the interior of the bones and shows that the greater number of them, in each bone, follow the directions of the two pillars of the arch, and thus give the greatest strength to the bones in the directions in which it is most required.

The bones, where they articulate with one another, are covered with a moderately thick layer of highly elastic cartilage, and by this, together with the very slight movements of which each bone is capable, a degree of elasticity is given to the foot, and consequently to the step, which

would be altogether wanting if the plantar arch were composed of a single mass of bone. This elasticity is far greater in the anterior pillar of the arch, which is composed of five comparatively long bones sloping gradually to the ground, than in the posterior pillar, which is short, narrow, and composed of a single bone, which descends almost vertically from the ankle to the gronnd. Hence in jumping from a height, we always endeavor to alight upon the balls of the toes, and thus break the shock which we should feel if, by accident, we descended upon the heels.

The ligaments which unite these bones to one another, and by which the movements of each bone upon the others are limited, are very numerous. We notice two of these ligaments, selecting those whose action is especially obvious in maintaining the shape of the plantar arch. One, the *plantar ligament* (A, Fig. 2), of great strength, passes from the under surface of the heel-bone, near its extremity, forward to the ends of the metatarsal bones. Another very strong ligament (B, in the figure) passes from the

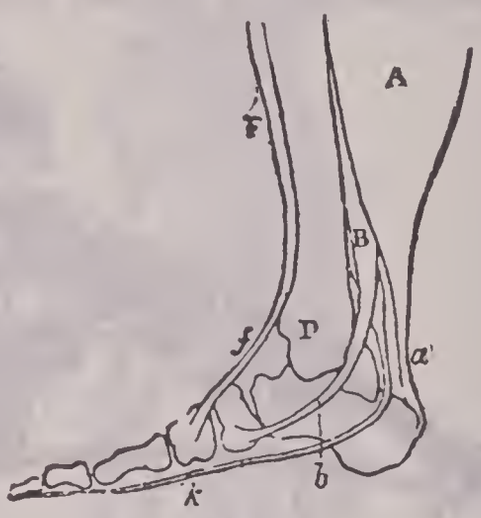


Fig. 3.

This figure represents some of the muscles and tendons seen on the inner side of the leg and foot.

A, the gastrocnemius and solcus muscles, forming the muscles of the calf; *a*, the tendo Achillis; B, the posterior tibial muscle; *b*, its tendon: D, the inner ankle; F, the anterior tibial muscle, attached above to the front of the tibia, below to the internal cuneiform bone; *k*, the flexor tendon of the great toe.

under and fore part of the heel-bone (F) to the under parts of the scaphoid bone (E). It underlies and supports the round head of the astragalus, and has to bear a great deal of the weight transmitted to that bone from the leg. It possesses a quality which most ligaments have not—viz., elasticity. This allows the head of the key-bone (D) to descend a little, when pressure is made upon it, and forces it up again, when the pressure is removed, and so gives very material assistance to the other provisions for preventing jars, and for giving ease and elasticity to the step.

The spot over which the ligament B extends is the weakest in the foot, the astragalus being there unsupported by

any bones; additional support is, however, afforded when most required, by the tendon of a strong muscle, the *posterior tibial* (Fig. 3, B), which passes from the back of the tibia (the chief bone of the leg) round the inner ankle, to be inserted into the lower part of the inner surface of the scaphoid bone. It frequently happens that the astragalus, being either insufficiently supported, or being overweighted, descends slightly below its proper level, causing a lowering of the arch, and a flattening of the sole of the foot. The defect, when slight, is known as 'weak ankle;' when more decided, it is termed flat-foot, and in extreme cases, the bone may descend to such an extent as even to render the inner side of the foot convex, when it naturally should be concave. This deformity is of great practical importance. There are two periods of life at which *flat-foot* is especially liable to occur: (1), in infancy, if the child be put upon its feet before the bones and ligaments—especially the latter—are strong enough to bear its weight; and (2), about the age of 14—a period at which growth is very quick, and

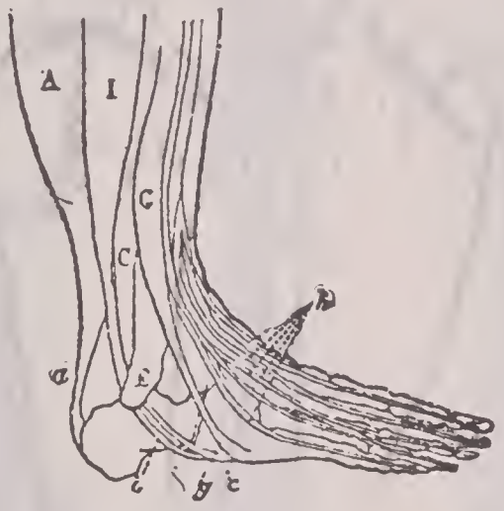


Fig. 4.

This figure represents some of the muscles and tendons on the outer side of the leg and foot.

E, lower end of fibula, forming the outer ankle; C, the short fibular muscle, attached above to the fibula, and below by its tendon (*c*) to the outer metatarsal bone; I, the long fibular muscle, its tendon (*i*) running behind the outer ankle and under the instep to the metatarsal bone of the great toe; G, the anterior or third fibular muscle, attached above to the fibula and below by its tendon (*g*) to the outer metatarsal bone; *h*, the extensor tendons of the toes.

the body consequently attains considerable and rapid augmentation of weight. If young persons of this age are obliged to be a great deal on their feet, and perhaps additionally to carry weights (as, for example, butchers' and bakers' boys, and young nursemaids), the chances that flat-foot will occur are increased.

Noting now the movements of the foot on the leg, we see a striking combination of variety of movement with general security. This combination is effected by the harmonious action of three *joints*, each of which acts in a direction different from the others. The first of these joints is the ankle-joint, formed by the bones of the leg—the tibia and

fibula—above, and the astragalus below. By this joint, the foot is bent or straightened on the leg. The second joint is between the astragalus and the heel-bone, and it permits the foot to be rolled inward or outward; while the third joint is between the first and second row of tarsal bones—namely, between the astragalus and calcaneum behind, and the scaphoid and cuboid bones in front, and allows the degree of curvature of the plantar arch to be increased or diminished within certain limits.

The joints, however, merely allow of movements; they do not effect them; this is the special function of the *muscles*. These movements are effected by various muscles: (1) the *muscles of the calf* (Fig. 3, A), attached above to the bones of the thigh and leg, and below by the *tendo Achillis* to the heel-bone; (2) the *posterior tibial* (Fig. 3, B), attached above to the tibia, and below by its tendon to the scaphoid bone, and (3) the *short fibular* (Fig. 4, C), attached above to

Fig. 5. Fig. 6.

the fibula, and below by its tendon to the outer metatarsal bone. The calf-muscles, whose tendon is inserted into the heelbone, are large and very powerful, for in raising the heel, they have to raise the weight of the body. The other two muscles, the posterior tibial and the short fibular, turn round the inner and the outer ankle respectively, and are inserted into the inner and the outer edges of the instep; the former being attached to the scaphoid, and the latter to the outer metatarsal bone. They not only assist to raise the ankle, but also support it laterally. The muscle whose tendon is on the inner side of the foot (the posterior tibial), effects the two movements which are associated with the raising of the heel-bone, namely, the turning of the foot inward, and the increased flexure of the arch.

The raising of the toes, the turning of the foot outward, and the straightening of the sole are effected by two muscles, the *anterior tibial* (Fig. 3, F) and the *third fibular* (Fig.

4, G), whose tendons pass, one in front of the inner ankle, and the other in front of the outer ankle, to the corresponding edges of the instep, and are inserted into the internal cuneiform and the outer metatarsal bones. These muscles are direct flexors of the tarsus upon the leg; the former raising the inner, and the latter the outer border of the foot.

Another point in the anatomy of the foot that requires notice, is the mode of union of the metatarsal with the tarsal bones. In these joints in the fourth and fifth toes a slight revolving motion can take place, which probably enables the outer metatarsals to adapt themselves to inequalities of the ground, and to equalize the distribution of the weight which is thrown upon the foot; while, in the corresponding joints of the three inner toes, scarcely any motion can occur—a provision by which additional strength is given to the inner side of the foot on which the weight of the body most directly falls.

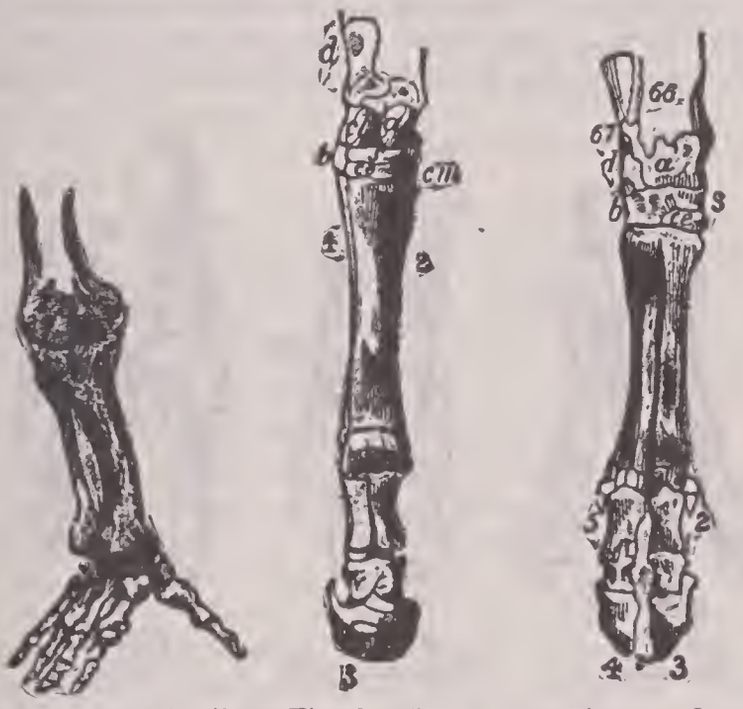


Fig. 7.—Foot of Gorilla. Fig. 8.—Horse. Fig. 9.—Ox.

The skin of the sole is very tough and strong; and intervening between it and the bones and long plantar ligament is a thick pad of fat, which acts the part of a cushion in defending the adjacent parts from injurious pressure, and in deadening the jars and shocks that would otherwise he felt in leaping, etc.

For WALKING, RUNNING, and JUMPING, see GYMNASTICS.

If we compare the human foot with the feet of other mammals, we find that it presents certain peculiarities, all of which have reference to man's erect posture. The chief peculiarities are—1. The greater relative size of the tarsal bones, as compared with the other bones of the foot, and the more perfect formation of the plantar arch, which is higher and stronger than in any of the lower animals. Strength and elasticity are thus combined in the human foot in the highest degree. 2. The great toe is remarkable in man for its size and strength, and for the firm manner in

which its metatarsal bone is joined to the other bones, so as to render it the main support to the foot. 3. If we compare the human foot with that of the gorilla (Fig. 7) or any other anthropoid ape, we see that the toes are short and small in man in the relation to the other parts of the foot, while in the gorilla the toes form the greater part of the foot. Indeed, a reference to Fig. 7 shows that in this animal (and the same is the case in all apes and monkeys) the organ in question is rather a *hand* than a *foot;* hence the term *quadrumanous,* as applied to this class of animals. There is scarcely any plantar arch, and the weight of the body bears chiefly on the outer edge of the foot; the digits are long and strong, and the inner one diverges so as to form a thumb rather than a great toe.

It remains to notice some of the most marked varieties of form which the bones of the foot present in mammals. In the following group of figures, the same letters are attached to the same bones. Thus, *a* marks the astragalus; *cl,* the calcaneum or heel-bone (the posterior projection of which forms the hock of the horse); *s,* the scaphoid; *b,* the cuboid;

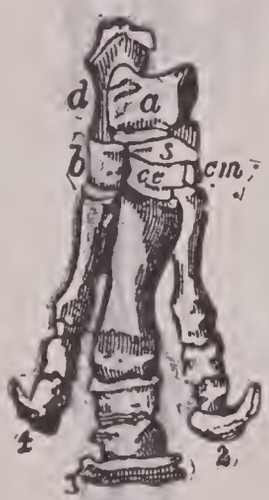


Fig. 10.
Rhinoceros.

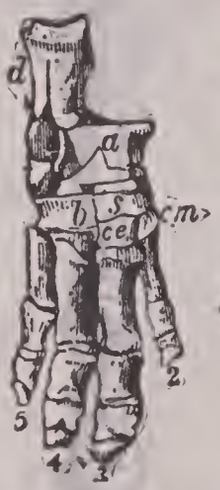


Fig. 11.
Hippopotamus.

Fig. 12.
Elephant.

ce, the ecto-, or outer, *cm,* the meso-, or middle, and *ci,* the ento-, or internal cuneiform. Now, as a general rule in all mammalia, the ecto-cuneiform supports the third or middle of the five toes when they all are present, the meso-cuneiform the second, and the cuboid the fourth and fifth. Bearing in mind this law, we see that the large bone in the horse, known as the cannon-bone, which is articulated to the ecto-cuneiform, *ce,* is the metatarsal of the third toe, to which are articulated the three phalanges of that toe, the last phalanx, 3, being expanded to form the hoof. The small bone (not shown in the figure), popularly known as the splint-bone, and articulated to the meso-cuneiform, is the rudimentary or stunted metatarsal of the second toe, 2; and the outer splint-bone, articulated to the cuboid, is the rudimentary metatarsal of the fourth toe, 4; so that in the horse there is only one toe, the third, sufficiently developed to reach the ground, with mere traces of a second and fourth toe on either side.

In the foot of the ox, the cuboid, *b*, is relatively larger than in the horse, and is equal in size to the ecto-cuneiform, *ce*. The cannon-bone articulates with both these tarsal bones, and hence answers to the metatarsal bones of both the *third* and *fourth* digits: it is accordingly found to consist of two distinct bones in the fetus; and in the adult it is divided internally into two cavities, and its original separation is marked out by an external elongated ridge. At the lower end are two distinct joints for the phalanges of the third and fourth toes. While in the horse there are the rudiments of the *upper* part of two toes (the second and fourth), in the ox there are the rudiments of the *lower* parts or phalanges of two toes (the second and fifth), forming the 'spurious hoofs,' and marked 2 and 5 in the figure. In the rhinoceros there is one principal toe (the third), as in the horse, with the second and fourth toes in a less developed state; while in the hippopotamus there are two principal toes (the third and fourth), as in the ox, with the second and fifth toes not fully developed. In the elephant, there is a fifth digit added, answering to the human great toe, and articulating with an ento-cuneiform bone, so that in the foot of this animal are all the bones occurring in the human foot.

Prof. Owen, from whose works these comparisons are drawn, concludes from these and similar observations that the course of the simplification of the five-toed foot is, first, a diminution and removal of the innermost toe; next of the outermost; then, of the second; lastly, of the fourth; the third or middle toe being the most constant and (in the lower animals) most important of the five.

FOOT: the most common unit of lineal measure all over the world. It was evidently taken originally from the length of the human foot, and as that varies in length, so does the measure; each country, and at one time each town, having a foot of its own. The three foot-measures that occur most frequently are the Paris foot, or *pied de roi*, the (German) Rhenish foot, and the English. Compared with the French *mètre* (=3·28090 ft. Eng.), they stand thus:

	Mitre.		Inches English.
English foot	= 0·30479	Paris foot	= 12·78912
Paris "	= 0.32484	Rhenish "	= 12·35652
Rhenish "	= 0·31385		

In round numbers, 46 French feet = 49 English feet, 34 Rhen. or Germ. feet = 35 English, and 57 French feet = 59 Rhen. The Russian foot is equal to the English. Almost every German state has or had a different foot. The Rhenish foot is that used in Prussia. The longest foot is the old Turin foot = 20 inches English. Many local feet are only about 10 inches. The foot has almost uniformly been divided into 12 inches; the inch into 12 lines, often into tenths. The French *pied usuel* is the third part of the mètre. See YARD; METRE.

FOOT, SOLOMON: 1802, Nov. 19—1866, Mar. 28; b. Cornwall, Vt.: lawyer. He graduated at Middlebury Col-

lege 1826, became tutor in Vt. Univ. 1827, was prof. of nat. philos. in the Castleton Acad. of Medicine 1828–31, was admitted to the bar 1831, and settled in Rutland. In 1833, 36–38, 47 he was a member of the legislature and 1837–8, 47 speaker, 1843–47 was a member of congress, and from 1850 till death was U. S. senator. He was a whig in early life, became a republican 1854, served in both branches of congress as chairman of important committees, and was pres. pro tem. of the senate 1860–63, Mar. 4, part of the 36th and all of the 37th congress.

FOOTA-BONDON. See Bondon.

FOOT AND MOUTH DISEASE. This disease may occur in man, being transmitted either directly by inoculation with some of the discharges, or by milk or cream, or butter or fresh cheese made therefrom, from a diseased cow. The cream is said to be especially rich in the infectious elements of the disease. In man the affection begins with fever, headache, dizziness, and malaise, preceded commonly by a chill or chilly sensations. Diarrhœa is an early symptom. After three or four days of these indefinite symptoms the fever falls and then a catarrh of the mouth and throat appears; the mucous membrane is red and streaked with mucus, and usually is studded also with vesicles. These latter often suppurate and break down into small ulcers. A vesicular eruption is frequent also on the fingers and toes and occasionally is seen on the lips. Its duration in the human subject is from two to four weeks. The disease is seldom fatal in adults, but it is serious in infants. When the diarrhœa is marked, the disease may be mistaken for typhoid fever; when the mouth lesions are pronounced it is often thought to be aphthous sore mouth. The appearance of stomatitis should, however, arouse suspicion whenever foot and mouth disease is present in cattle in the neighborhood or in the region from which the milk supply of the city is obtained.

FOOT'-BALL: game in which a large light ball is kicked. Foot-ball may be played by any even number of persons divided into two sides. The ball used in England is a hollow india-rubber sphere covered with strong leather, but in the United States the regulation ball is oval in shape and also leather covered. A large level piece of ground or lawn is marked off with goal lines at each end, and the game is played in the intervening space, by each side of players endeavoring to kick the ball to the goal of their opponents and to keep it from their own goal. In England the goals are formed each of two upright posts. Under the Rugby rules each set of posts are joined by a cross-bar at a height of 10 ft., and under the foot-ball Assoc. rules a tape at the height of 8 ft. takes the place of the bar. The movement in the Rugby game is to kick the ball between the posts and over the cross-bar to the opposite goal; in the assoc. game to kick the ball through the posts below the tape. In the United States the game is played both in conformity with the Rugby plan and rules, and under rules authorized and adopted by the

American Inter-Collegiate Assoc. According to the latter, which are most generally observed, the ground must be 330 ft. long, 160 ft. wide. The outline of this field is made by heavy white lines marked, as are the lines in a tennis court, with lime. This field is also traversed by transverse lines five yards apart marked for the convenience of the referee in judging the distance gained or lost by either side. In addition to these transverse lines the field is marked by longitudinal lines also five yards apart in order to assist the referee once more in measuring distance rapidly with his eye. This latter marking was rendered necessary by a rule providing that within that section of the field the quarterback may run with the ball provided he goes a certain distance out, that is, toward the side line, from the man who puts the ball in play in the centre. This same five yard distance governs a forward pass. The lines which mark the ends of the field are called goal lines, and in the middle of each is a goal made by erecting two posts 18 feet, 6 inches apart with a cross bar 10 feet from the ground. The ball is a prolate spheroid in shape consisting of a rubber bladder in a leather cover.

The game is played by 11 men on a side, these 11 men being called a team. For the purpose of general distinction, although different formations are possible, the seven men who play in the forward line, that is on a line with the ball when it is put in play, are called the rushers, the men behind them the backs. The distinguishing terms for the men in the line are of interest. First there is the centre rusher, or centre, or snap-back, which term designates the man who stands in the middle of the line and usually puts the ball in play in a scrimmage. The men on his right and left are called guards, the men next beyond them towards the ends are called tackles and the two men on the ends of the line are called the ends. The man close behind the centre rusher is called the quarter-back. The two men some feet behind him are called the half-backs and the fourth man behind the line is called the full-back. In executing various plays the men take up different positions on the field, but they are usually distinguished by their positions as above.

The game is started by placing the ball in the middle of the field and a man of the side in possession must then kick it at least 10 yards into the territory of the opponents, his own men being behind him when he kicks the ball and the opponents standing at least 10 yards back from the middle line of the field. The choice of goals and the possession of the ball having been determined by the toss of a coin, the side winning has the privilege of thus either kicking off or selecting either goal. When the ball is once kicked off any man who is on side, that is, between the ball and his own goal, may secure it and run with it and when he is thus running may be tackled by his opponents and brought to a stop. If he is thus tackled and stopped he calls 'down' and the ball is placed on that spot for a scrimmage. When the ball is thus down the two teams line up opposite each

other, the side with the ball endeavoring to protect its men so that one of the backs may be able to secure the ball and make a run with it, kick it, or pass it, while members of the opposing side are endeavoring to break through and stop this. The men of the side which has the ball in its possession may not use their hands or arms to obstruct their opponents, but may do this with the body only. The players of the side not in possession of the ball on the other hand are privileged to use their hands and arms to break through the ranks of their opponents. The man who has the ball in his possession, that is running with it, may use his hands and arms to ward off the opponents, but the rest of his side may not. The play thus continues by a succession of downs and runs interspersed with kicks, for a side may kick or pass the ball under certain limitations instead of running with it if they so desire.

In order to prevent a side holding the ball indefinitely without making progress there is a rule providing that in three attempts the side must advance the ball 10 yards or surrender it to the opponents. For this reason it is quite customary after two attempts, if the desired ground has not been gained, for the side in possession to kick the ball, thus transferring it to the possession of their opponents as far into the opponents' territory as possible. One forward pass is allowed to a scrimmage under certain restrictions, and a kicked ball striking the ground puts all the players of the kicker's side 'on side,' otherwise a man who gets ahead of the ball when last touched by one of his own side behind him may not touch the ball. When the ball goes across the side line it is out of bounds and if it has gone out of bounds through being kicked, it belongs to the opponents, but if a man carries it out of bounds, in his possession, his own side has the right to it. The ball is brought back to the spot where it crossed the line and is put in play by the holder walking in a certain distance and putting it on the ground for a scrimmage as already described.

The game thus proceeds until the ball approaches one or the other goal line and here begins the question of generalship for scoring. If the ball be kicked by a drop kick over the cross bar of the opponent's goal it counts the side thus kicking it four points. If the ball be carried by the player of that side across his opponent's goal line or secured by him after it has been kicked across it scores a touch-down, which counts five points and also entitles the side making it to a try at goal. This is performed either by kicking the ball out to a player who catches it and makes a mark with his heel, the ball then being kicked from any point behind that mark, or being brought directly out by a player of the side which has touched it down and held on the ground for another of his side to kick. In either event if the touch-down be converted into a goal by the kicking of the ball over the cross bar it adds an additional point for this scoring.

There is one other possible means of scoring and that is

when a side is pressed by the opponents, and, instead of the opponents securing the ball, the defenders of the side secure it and either kick, pass, or carry it across their own goal-line and touch it back behind their own goal. This entitles them to carry the ball out 25 yards for a kick. The opponents stand on the 25 yard line while this kick is made. This safety, however, as it is called, counts two points against the side making it.

The game is divided into 2 halves of 35 minutes each with a 10-minute intermission, and the side which has scored the greater number of points at the end of the full period of play wins the game.

American football, while it started from the English Rugby Union rules, has developed in many directions so that the game would not now be recognizable to an Englishman. The one thing that he would see that possibly reminded him of Rugby would be that occasionally a man runs in the open field with the ball. But the various formations and the tactics adopted would puzzle him exceedingly. Like the Rugby Union, however, there is some kicking in it, but far less than in the English Association. In the English scrimmage the two lines of forwards push until the ball pops out somewhere, whereas in the American scrimmage the man in the center who has possession of the ball snaps it out with his hand whenever he is ready to do so to the quarter-back who stands directly behind him and this man passes it to some other player of his own side. This enables the Americans to carry out their very elaborate system of plays because the ball can be absolutely directed at any time to any spot. So perfect has this development become that the quarter-back gives signals for the plays by means of which signals the entire team knows exactly what man is to receive the ball and where he is to run with it when he has received it. Thus the others may assist him very materially in making his gain. Some idea of the variety of plays can be gathered from the fact that teams can without difficulty execute no less than 40 or 50 plays, each distinct from the other. It is not difficult to imagine that with this highly developed form of attack a most thorough and well-studied plan of defense is equally necessary. It is also not difficult to understand that this development on both sides has brought about specialization in the work of various players so that almost every position on the field has a distinct line of duties which its incumbent must be able to perform with skill and accuracy. The signals are quite elaborate codes, devised for easy memorizing, but at the same time sufficiently intricate and bewildering as to render the liability of discovery by the opponents very small.

In the American game the quarter-back usually gives these signals, although the captain sometimes prefers to give them himself.

In America the game has had already three great epochs

as it were. The first in the eighties when the 'block game' was legislated out of existence, then in the early nineties when 'momentum mass' plays were excised and finally in 1906 when the ten yard rule was adopted.

A widespread public sentiment was advanced in favor of such a change in the rules as might bring about more 'open play,' and it was further felt by the committee and their advisers that the rules should be so modified and the powers of the officials so increased as to eliminate to the greatest possible extent unsportsmanlike tactics, and with these ends in view the committee decided upon the incorporation of two important changes. The first of these was the adoption of the 10-yard rule together with the forward pass and on side kick. The second general change was the incorporation of rules that in some cases greatly increased the penalty for unfair tactics, and in others did away with all excuses for indulgence in certain rough plays, at the same time providing for more efficient work by officials. To make sure that the wishes of the committee were carried out in this matter, the duties of the linesman were enlarged and he was made practically an assistant to the umpire and given absolute power to deal with certain classes of fouls. A second umpire was added. The American game thus has for its conduct four officials, the referee whose duties are principally related to the progress of the ball, the umpires who have charge as it were of the conduct of the players, the linesman who acts as an added umpire, at the same time assisting the referee in the matter of measurements and time keeping.

FOOTE, *fût*, Andrew Hull: U. S. naval officer: 1806, Sep. 12—1863, June 26; b. New Haven; son of Samuel A. Foote, U. S. senator. He was appointed midshipman in the navy 1822, Dec. 4, served on Com. Porter's expedition against the W. India pirates; was commissioned lieut. 1830, appointed capt. of the *Perry* and engaged in suppressing slave-trade on the coast of Africa 1849–52, was promoted commander 1852, and assigned to command the *Plymouth* on the Chinese station 1856. He reached his post shortly before the opening of the Anglo-Chinese war, and while arranging to protect American property was fired on by the Barrier forts. On being refused an apology for the act he attacked the four forts with two vessels, breached one fort and captured the others by storm, losing only 40 of his 280 men, though the forts were manned by 5,000 men. He was promoted capt. 1861, and made flag officer and commander of the western flotilla. The organization and equipment of this fleet under his direction was one of the most difficult and remarkable feats of the civil war. In 1862, Feb. 7, he assaulted and captured Fort Henry on the Tennessee, and on the 14th bombarded Fort Donelson an hour and a half with great effect. The army under Gen. Grant occupied it on the following day. In Mar. and Apr. he cooperated with Gen. Pope in a number of attacks

on Island No. 10, excepting Vicksburg the strongest Confederate possession on the Mississippi river, and on Apr. 7 received its surrender. In the midst of most important service and at the height of success, a wound received at Fort Donelson forced him to resign his command and return home. He was promoted rear-admiral and was voted the thanks of congress 1862, June 16, was appointed chief of the bureau of equipment and recruiting June 22, and was ordered to relieve Rear-Admiral Dupont of Charleston 1863, June 4. While on his way to that station he was suddenly taken sick and died in New York. His character was impressive for moral excellence. He wrote *Africa and the American Flag* (1854). Consult Hoppin, *Life of Rear Admiral Andrew Hull* (1874).

FOOTE, Arthur, American composer: b. Salem, Mass., 1853, March 5. He was graduated at Harvard 1874, became a teacher of the piano and organist of the First Church in Boston, and has devoted much time to composition, in which field he has been very successful, having published a cantata *Hiawatha*, a trio in C major for piano, violin, and 'cello; suites for the orchestra; an overture, *In the Mountains;* songs, and pianoforte pieces.

FOOTE Henry Stuart, American statesman: b. Fauquier County, Va., 1800, Sep. 20; d. Nashville, Tenn., 1880, May 20. He was admitted to the bar in 1822; removed to Mississippi in 1826 and entered politics. In 1847 he was elected to the United States Senate, and in 1852 was elected governor of the State. He was a strong opponent of secession at the convention held at Knoxville, Tenn., in 1859, but when secession was an assured fact, he accepted an election to the Confederate Congress, where he was active in his opposition to most of President Davis' measures.

FOOTE, Lucius Harwood: American diplomatist: b. Winfield, N. Y., 1826, April 10. He was educated at Knox College and at the Western Reserve University; went to California in 1853; and was admitted to the bar in 1856. He held various municipal offices in Sacramento, and became adjutant-general of California in 1861, and was consul to Valparaiso, Chile, 1878–81; was chargé d'affaires for Chili in 1881; and in 1882 he was sent to Central America on a special diplomatic mission. Appointed minister to Korea in 1882, he distinguished himself in the protection of Japanese and other foreigners in the nationalist revolt in Seoul in 1883, and received the thanks of the emperor of Japan, the Chinese government, and the emperor of Korea for his services. He resigned in 1884 and returned to California, where in 1890 he was made treasurer of the San Francisco Academy of Sciences. He has written *Red Letter Day and Other Poems* (1882); and *On the Heights* (1887).

FOOTE, Mary Hallock: artist and author: b. New York, 1847, Nov. 19; wife of Arthur D. Foote. She received

her art education in the Cooper Union School of Design for Women, and was employed first to draw on wood the illustrations of articles for *The Century, St. Nicholas,* and other pictorial publications. The delicacy of her work soon attracted wide attention and led to her engagement as illustrator of several books, including *Mabel Martin, The Hanging of the Crane,* and *The Skeleton in Armor,* and as one of the artists employed to illustrate *Longfellow's Poems.* Subsequently she began writing short stories of decided merit; and also published two novels of western life, *The Led Horse Claim* (1882), and *John Bodewin's Testimony* (1885). Her other publications include *The Last Assembly Ball* (1889); *In Exile and Other Stories* (1894); *The Chosen Valley; Cœur d'Alène* (1894); *The Cup of Trembling and Other Stories* (1895); *The Little Fig Tree Stories* (1900); *The Prodigal* (1900); *The Desert and the Sown* (1902); *A Touch of Sun and Other Stories* (1903).

FOOTE, Samuel: 1720–77: b. Truro, Cornwall, England; of a good family: actor and writer of comedy. He was educated at Worcester College, Oxford, and about 1740 entered the Temple; but after a career of 'pleasure,' in the course of which he managed to dissipate two fortunes which had been left him, he turned to the stage for support, and 1744 made an unsuccessful debut in the character of Othello. In 1747, he opened the Haymarket Theatre —where he was at once director, actor, and dramatic author—with a piece entitled *Diversions of the Morning.* In this and other pieces, he introduced well-known living characters, and, by his admirable powers of mimicry, succeeded in drawing large audiences, till the theatre was closed by order of the magistrates. After 1752, he continued to perform alternately in London and Dublin. In 1766, he broke his leg by a fall from his horse, and amputation was found necessary. He, however, recovered his health and spirits, and even turned the incident to account on the stage, composing parts expressly adapted to his own state. Many comic anecdotes of Foote are given in Cooke's *Memoirs of Samuel Foote* (1805). His conversation must have been inimitably comical. Dr. Johnson, who above most men had a power of refusing to be pleased against his will, met Foote for the first time at Fitzherbert's, and assumed his most ursine manner; but to no effcet: 'I was obliged,' he says, 'to lay down my knife and fork, throw myself back in my chair, and fairly laugh it out. Sir, he was irresistible.' His plays, four of the best of which are *An Auction of Pictures, The Minor, The Liar,* and *The Mayor of Garratt,* have been frequently published, but never in complete form. See Forster's essay in the *Quart. Rev.,* 1854.

FOOTE, Samuel Augustus, American statesman: b. Cheshire, Conn., 1780, Nov. 8; d. there 1846, Sep. 15. He was graduated at Yale College in 1797; served in the legislature for many years; was member of Congress in

1819–21 and 1823–5; served one term in the United States Senate, was governor of Connecticut, and one of the presidential electors on the Clay and Frelinghuysen ticket in 1844. It was he who in 1829 introduced the bill 'on the public lands' that occasioned the famous debate between Hayne and Webster.

FOOTMEN, a collector's name for the small gray and yellowish moths of the family *Lithosiidæ*, which have simple antennæ, rather narrow fore wings, beneath which the broad hind wings are folded when at rest.

FOOT'-POUND: the unit by which the *work done* by a force is estimated; thus (taking 1 lb. and 1 ft. as the units of weight and distance), if 1 lb. be raised through 1 ft., the *work done* is equal to 1 foot-pound; if 10 lbs. be raised 9 ft., the *work done* is 90 foot-pounds; and generally, if W. represent the *work done*, P the *weight in pounds*, and *h* the *height in ft.* then W (in foot-pounds) = *Ph.* See DYNAMICS; FORCE; WORK.

FOOT-ROT: inflammatory and ulcerous disease affecting the feet of sheep; closely allied to, but much more virulent than, Foul in the Foot (q.v.) which affects both sheep and cattle. Foot-rot is not common in this country but occasionally occurs and sometimes proves destructive. Owing to the different form and greater development of their hoofs, Merino sheep are much more difficult to treat for this disease than the English breeds. They are also more liable to be attacked. The cause of the disease is uncertain. Some hold that it is due to the collection of mud and filth between the hoofs, or to standing in wet places or on fermenting manure; others believe that it is not spontaneously generated but spreads only by contagion. The first indications of foot-rot usually are redness of the skin, heat over the heels, just above the cleft of the foot, and an offensive odor. The sheep becomes lame, an ulcer forms and works its way between the flesh and the horny covering of the foot, soon followed by a discharge of fetid matter. If unchecked the disease makes rapid progress. The hoof, and soon the whole foot becomes disorganized and the animal perishes. The genuine foot-rot is highly contagious. Upon its first appearance every animal showing a trace of the disease should be separated from the remainder of the flock and the quarters thoroughly disinfected. Treatment consists in carefully cleaning the feet, cutting away all the horn that covers the diseased places, and thoroughly applying to every portion of the affected parts some caustic remedy. If taken in the first stages, before ulcers are formed, cutting the hoof will not be required. A wash consisting of one part sulphuric acid and three parts of water, promptly and repeatedly applied with a feather after the surface has been thoroughly cleaned, may effect a cure. For severer cases caustic applications combined with antiseptics are indicated. A saturated solution of blue vitriol, kept hot while in use, has proved a remarkably efficient remedy in extreme cases.

The treatment should be followed by disinfection of the premises.

FOOT-WASHING, in Religious Ceremonial: an observance among certain sects, which finds its origin in a liberal compliance with the instruction of Christ who, at the passover on the eve of the crucifixion, having washed the feet of his disciples said to them, 'I have given you an example that ye should do as I have done unto you.' As Christianity was extended in hot eastern countries and among sandal-wearing peoples accustomed to frequent bathing of the feet, there were constant occasions for following the outward form of this example as well as its inward spirit. Consequently, it became a part of hospitality among the primitive Christians to make provision for washing the feet. But gradually the act became a ceremony rather than a service; and was performed at appointed seasons, rather than in times of need. And in proportion as the spirit of kind condescension declined, the pomp of the ceremonial was increased. In Spain, about the 8th c., the observance was made part of Easter celebration; in the Greek church it was declared a sacrament, and in the Latin, was regarded as effective in procuring remission of sins. During the middle ages it had a place in the consecration of bishops and the crowning of kings. At the Reformation, Luther condemned the outward, literal ceremony as vain, but advocated in its place a habitual spirit of genuine humility and of practical kindness as occasion offered; the Anabaptists maintained the literal observance; and, since that time, several of the smaller sects have been strict in enforcing it (see TUNKERS). In the imperial chapels of Russia it is solemnly observed; at the courts of Lisbon, Madrid, Munich, and Vienna, and in many cathedrals and convents it is customary on a set occasion to wash the feet of 12 poor, old men, and at Rome, in the Clementine chapel, the old men chosen to represent the apostles are arrayed in woolen tunics, and the pope, dressed like them, slightly washes, wipes, and kisses one foot of each. At the entertainment which follows, the pope and cardinals serve the table and then dismiss their guests, giving them the dresses, towels, and a small sum of money. The Anglican church in its earlier days maintained the observance literally, but in modern times it gathers every year at Whitehall a company of poor persons equal in number to the years of the monarch's reign, each of whom receives raiment, food, and a sum of money made up of a number of pieces equalling the years of the monarch's age.

FOP, n. *fŏp* [Dut. *foppen*, to jeer, to banter: It. *fiappe*, a flap with a fox-tail: Gael. *faop*, to protrude, to swell]: a man devoted to his dress and personal appearance; a vain conceited fellow; one over-nice and affected in dress, speech, and behavior; a swell; a dandy. FOP'PERY, n. *-pĕr-ĭ*, excessive fondness of dress; idle affectation. FOP'PISH, a. *-pĭsh*, dressing in the extreme of fashion; vain; affected in

manners. FOP'PISHLY, ad. *-lĭ*. FOP'PISHNESS, n. the state of being foppish.—SYN. of 'foppish': dandyish; dandified; spruce; finical; coxcombical.

FOR, prep. *fŏr* [Goth. *faur*, or *faura;* Icel. *fyrir*, before: Ger. *für*, for: L. *pro*, before]: in the place of; towards; on account of; beneficial to; with respect or reference to; for the sake of, etc. AS FOR, prep. phrase. FOR ALL THAT, notwithstanding. FOR ALL THE WORLD, wholly; exactly. FORASMUCH AS, seeing that; in consideration of: CONJ. a phrase by which is introduced a reason of something before advanced.

FOR, *fŏr*, prefix [Ger. *ver;* Goth. *fra*, or *fair;* F. *for*, away: L. *foris*, without]: not; against; forth; away—as FORBID, to bid a thing away. FORGET, to away-get; to lose from memory. FORGO or FOREGO, to go without or against. FORFEND or FOREFEND, to ward off.

FORAGE, n. *fŏr'āj* [OF. *fourage*, forage, pillage: F. *fourrager*, to fodder: Ger. *futter:* Swiss, *fuhr*, victuals, food; Gael. *feurach*, abounding in grass, grassy]: *literally*, a search for food by roving; food for horses and cattle, as grass, hay, or oats; provisions in general: V. to rove or range in quest of food; to collect food for cattle or horses; to supply with fodder; in *OE.*, to rove; to ravage. FOR'AGING, imp.: ADJ. collecting provision for horses and cattle; wandering in search of food: N. an incursion for forage or plunder. FOR'AGED, pp. *-ājd*. FOR'AGER, n. *-ėr*, one who. FORAGING-CAP, an easy-fitting light cap, fit for soldiers on a foraging-party. FORAY, n. *fŏr'ā*, a sudden incursion into a country in a hostile manner, as in border warfare.

FORAGE: hay, straw, and oats supplied to horses of officers and soldiers in the army. Where troops are together, the provision of forage devolves on the commissariat: officers of the staff, etc., who are entitled to horses, under certain circumstances receive a money allowance, instead of forage in kind, varying according to the place and the price of provender. Cavalry horses in the United States army are each allowed about 14 pounds of hay and 14 quarts of oats per day. In default of oats about 12 pounds of either barley or corn for each horse may be substituted. Corn fodder is not as desirable as hay, but is sometimes used when the latter cannot be obtained. Each mule is daily supplied with 14 pounds of hay, but is given only 9 pounds of grain.

FORAKER, JOSEPH BENSON, American politician: b. near Rainsboro, Highland County, Ohio, 1846, July 5. He enlisted in the 89th Ohio infantry in 1862, participated in the battles of Missionary Ridge, Kenesaw Mountain, and Lookout Mountain and in Sherman's 'march to the sea,' served on the staff of Gen. Slocum, and was mustered out in 1865 with the rank of first lieutenant and brevet captain. Subsequent to the War he studied for two years at the Ohio Wesleyan University, in 1869 was graduated from Cornell University, and in the same year was admitted to the bar

at Cincinnati and there began the practice of law. In 1879 he was elected judge of the superior court of Cincinnati, from which post he resigned in 1882. He was Republican candidate for the governorship of Ohio in 1883, but was defeated by Hoadly, Democrat; was elected in 1885 and re-elected in 1887; and was again defeated in 1889, this time by Campbell. In 1896 he was elected United States Senator to succeed Calvin S. Brice, and in 1902 re-elected. He was chairman of the Ohio Republican State conventions of 1886, 1890, 1896, and 1900; a delegate-at-large from Ohio to the national Republican conventions of 1884, 1888, 1892, 1896, and 1900, being chairman of the Ohio delegation in 1884 and 1888; and presented to the conventions of 1896 and 1900 the name of William McKinley for nomination to the Presidency. He attained the largest law practice in southern Ohio, and became well known in that State as a corporation attorney and a vigorous orator on political questions. His election to the Senate at once made him the Republican leader of Ohio. In the Senate he took a prominent part in the discussions connected with the Spanish-American war, of which he was a conspicuous advocate.

FORALITES, n. plu. *fŏr'ă-līts* [L. *fŏrō*, I bore; Gr. *lithŏs*, a stone]: in *geol.*, certain tube-like markings in sandstones and other strata.

FORAMEN, n. *fŏr-ā'mĕn*, FORAMINA, n. plu. *fŏr-ăm'ĭ-nă* [L. *fŏrāmen;* It. *forane*, an aperture—from L. *fŏrō*, I bore]: a small opening. FORAM'INATED, a. *-nā-tĕd*, having little holes or perforations. FORAM'INOUS, a. *-ĭ-nŭs*, perforated in many places; porous. FOR'AMINIF'ERA, n. plu. *-nĭf-ĕr-ă*, or FORAMINIFERS, n. plu. *fŏr'ăm-ĭn'ĭ-fĕrz* [L. *fĕrō*, I bear]: in *zool.*, a class of Protozoa of very simple organization, but possessing complicated shells, often perforated for the passage of processes of the body substance. FOR'AMINIF'EROUS, a. *-ĕr-ŭs*, allied or relating to the foraminifera. FOR'AMIN'IFER, n. *-ĭ-fĕr*, one of the foraminifera.

FORAMINIF'ERA: group of most marine Protozoa (q.v.), consisting of a mass of homogeneous granular protoplasm, in which a nucleus has recently been shown to exist, and which fills and envelops a shell, sometimes chitinous or sandy, but most frequently calcareous, which may be one or many chambered, having one or many minute apertures (Lat. *foramina*, whence the name). Through these little apertures, long, delicate, granular and anastomosing protoplasmic processes are protruded for the prehension of food. Most of the species are minute, though one of more than two inches in diameter has been found in Borneo, and fossil forms approaching this size are well-known under the name of Nummulites (q.v.), from their resemblance to coins. The existing species are very numerous, and have been distributed into many genera. They are found among sea-sand, and among all the dredgings of deep water. The fossil species are still more numerous, and constitute a great part of some calcareous rocks, as of

chalk. The foraminifera are of very beautiful forms. Some of the simple ones are orbicular, some curiously flask-shaped; those in which the animal is divided into segments, and the shell consequently chambered, sometimes have the segments arranged in a straight line, sometimes spirally, sometimes alternately, etc. Linnæus and many naturalists ranked the foraminifera with the genus *Nautilus*, and they were reckoned among the most highly organized mollusks, a place from which later discoveries have completely removed them. They may be regarded as modifications of the simple Rhizopod (q.v.) type, and may be thus classified:

A. IMPERFORATA.—One terminal aperture.
1. Shell one-chambered, chitinous, *Gromidæ*.
2. Shell many-chambered, porcellanous, *Miliolidæ*.
3. Shell arenaceous, *Lituolidæ*.

B. PERFORATA.—Many minute apertures. Vitreous.
1. One-chambered, *Lagenidæ*.
2. Many-chambered, *Globigerinidæ*.
3. Many-chambered, with internal canals, *Nummulitidæ*.

See Carpenter on *Foraminifera;* Huxley, *Anat. of Invert. Animals.*

Foraminifera:

1, Orbulina universa; 2, Lagena striata; 3, Textularia; 4, Operculina; 5, Faujasina; 6, Rosalina globularis; 7, Cassidulina; 8, Part of two chambers of an Orbiculina; 9, Vertical Section of fossil Nummulite.

Fossil Foraminifera. The earliest records of this order yet observed are in sandstones near St. Petersburg, belonging to the Lower Silurian measures. Scattered through these sandstones are numerous green grains, shown by Ehrenberg to contain, in their interior, silicious casts of shells similar to the recent genera *Guttulina* and *Textularia*. Forms, apparently referrible to the last genus and to *Fusulina*, constitute a large portion of some beds of carboniferous limestone in Russia, and in the United States. Among

the Secondary rocks, and especially in the Chalk, foraminifera are very abundant. Chalk, indeed, is composed almost entirely of the perfect or broken shells of *Rotalia*, *Spirulina*, *Textularia*, etc. (see CHALK). In the tertiary strata they are not more numerous, but attain enormous size—gigantic compared with any that preceded, or with recent forms. Vast beds of limestone occur on the borders of the Mediterranean, composed almost entirely of these large forms. See NUMMULITES; NUMMULITE LIMESTONE.

FORASMUCH, conj. *fŏr'ăs-mŭch'* [made up of *for*, *as*, and *much*]: used with *as*, forasmuch as—and so equivalent to *by reason of the fact that*, or *in accordance with the fact that*.

FORAY: see under FORAGE.

FORBADE: pt. of FORBID, which see; did forbid.

FORBEAR, v. *fŏr-bär'* [*for*, away, and *bear*]: to refrain from; to spare; to withhold; to stop or cease; to pause. FORBEAR'ING, imp.: ADJ. patient; long-suffering. FORBORE', pt. *-bōr'*, did forbear. FORBORNE', pp. *-bōrn'*, withheld. FORBEAR'INGLY, ad. *-lĭ*. FORBEAR'ANCE, n. *-bär'ăns*, lenity; restraint of temper; exercise of patience. —SYN. of 'forbearance': abstinence; mildness; long-suffering; refraining; indulgence.

FORBEARS. See FOREBEARS.

FORBES, *fawrbz*, ARCHIBALD: war correspondent; b. Morayshire, Scotland, 1838; d. London, 1900, March 30. He was educated at home, by private tutors, and in Aberdeen Univ., served five years in the royal dragoons, and began his work in journalism in London 1865. At the outbreak of the Franco-German war 1870, he was engaged by the London *Morning Advertiser* as its field correspondent, with the privilege of choosing the side he desired to follow. From a knowledge of German tactics and language he concluded to accompany the Prussian armies, and subsequently witnessed the whole of that brief though bloody contest, sending to the *Advertiser*—often by much necessitated stratagem, long, personal, and descriptive letters instead of brief telegrams of results. Just before the siege of Paris he accepted an engagement with the London *Daily News*, which he held many years. He received the first intelligence of the intentions of the Commune, was the first to enter Metz, made a survey of Paris before the capitulation in the garb of a Prussian cavalryman, and entered the city with the conquering armies. In 1872 he was a spectator of much of the fighting in Spain, with the Republican, Carlist, and Alfonsist troops; 1874, visited India during the great famine; 1875, accompanied the Prince of Wales to India; 1876, took part in the military operations in Servia; 1877, joined the Russian army in the war against the Turks and was present at the crossing of the Danube, the capture of the Biela, the battle of Plevna (July 3), the engagements at Shipka Pass and the five days' assault on Plevna (Sep.): 1878 accompanied Sir Garnet Wolseley to Cyprus, and saw

the beginning of the Afghan war; 1879–80, went through the war in Zululand: and 1880, Oct. made a lecturing tour in the United States. His chief publications are: *My Experiences in the Franco-German War* (1872); *Glimpses through the Cannon Smoke* (1880); *Chinese Gordon* (1884); *Souvenirs of Some Continents* (1885); *William I. of Germany* (1888); *Barracks, Bivouacs, and Battles* (1891); *Havelock* (1891); *Afghan Wars* (1892); *Colin Campbell, Lord Clyde* (1895); *Camps, Quarters, and Casual Places* (1896); *Memories and Studies of War and Peace* (1896); *The Black Watch* (1896); *Life of Napoleon* III. (1898).

FORBES, DAVID, English geologist: b. Douglas, Isle of Man, 1828, Sept. 6; d. London, 1876, Dec. 5. As a civil engineer he traveled all over the world, studying rock formations and fossils, and writing: *On the Relations of the Silurian and Metamorphic Rocks of the South of Norway* (1855); *On the Geology of Bolivia and Southern Peru* (1861); and kindred treatises.

FORBES, *fawrbz*, DUNCAN, of Culloden: Scottish politician, Lord Pres. of the Court of Session: 1685, Nov. 10—1747, Dec. 10; b. in the neighborhood of Inverness. He studied law at Edinburgh, and at Leyden Univ.; was called to the bar, and soon appointed sheriff of Midlothian. He rapidly gained practice and political influence through a personal and business connection with the Great Duke of Argyle. During both of the rebellions, Forbes was prominent on the side of the Hanoverian government. In 1715, he was in the north, with his elder brother John, actively opposing the rebels; but as on all occasions, Forbes' partisanship was moderate. After the suppression of the rebellion, he was opposed to the project of carrying the prisoners out of Scotland to be tried by English juries, and to the forfeitures—and this on grounds of policy as well as of humanity; but the only effect of his moderation was to bring suspicion on his own loyalty. Nevertheless a few years later various offices were conferred on him, and in 1725 he was lord advocate.

Forbes greatly contributed to the prosperity of Scotland by fostering and developing her internal resources. His policy was to extinguish the rebellion by gaining over the Jacobites to the government. The purity and uprightness of Forbes' character were subjected to a severe test, when his whole correspondence during these troubled times came to light about 70 years after his death but the exposure presented no point of infringement on the most delicate honor. Forbes' views of political economy were not greatly in advance of his time; for in order to encourage the use of malt, he presented to the government a detailed scheme for preventing, or for punishing the use of tea. Forbes was appointed president of the court of session 1737. The rebellion of 1745 took him by surprise. Lovat, as is well known, betrayed both him and the government, and actually made an attack on Culloden House, from

which he was beaten off with great spirit by the president and his people. When the rebellion spread, he was forced to abandon his house, and take refuge in the island of Skye, till after the battle of Culloden. On his return, he was regarded with aversion by the government. Even the large sums of money which he had advanced were never repaid him; and it is said that the ingratitude of the government, with the perfidy of many of his friends and neighbors, who had changed sides more than once during this miserable affair, weighed so heavily on his spirits as to shorten his life. The most complete biography is that of Mr. Burton in his Lives of Simon Lord Lovat and Duncan Forbes, 1848.

FORBES, Edward: 1815, Feb. 12—1854, Nov. 18; b. at Douglas, Isle of Man: naturalist. He received an imperfect education in consequence of ill health; yet at the age of 16, he had considerable knowledge of botany, zoology, and geology. In 1831, Forbes went to London to become a student at the Royal Acad.; but deeming himself to lack artistic talent he turned his attention to medicine, and entered the University of Edinburgh. In 1836, he made his final choice to pursue the natural sciences. He attended lectures at Paris, where he studied under Geoffroy St. Hilaire, Jussieu, and De Blainville. His published observations made on his many rambles in his own land and abroad, attest his diligence as an observer, and his exact appreciation of analogies and differences of forms. Forbes may almost be regarded as the originator of the use of the dredge, which he employed in the Mediterranean and the Ægean, as well as in British seas. In 1841, he joined the surveying ship *Beacon*, as naturalist, surveying a part of Asia Minor. Returning 1843, he found that he had been elected to the chair of botany, King's College, London. He was soon afterward named curator of the Geological Soc.; and till his removal to Edinburgh he lived in a vortex of scientific labors and literary work. In 1851 he was named professor of natural history in the School of Mines; in 1852, was chosen president of the Geological Soc., an honor never before conferred on so young a man; and in 1853, was elected to the vacant chair of natural history in the Univ. of Edinburgh. But at the commencement of the winter session he was seized with a severe illness, which speedily proved fatal, in the very zenith of his fame.—Forbes did much to advance and systematize special departments of natural history. His classification of the British *Star-fishes* opened a new era in that branch of zoology; and his discovery that air-breathing mollusks lived at the period of the Purbeck beds, has been the means of rectifying many erroneous hypotheses, and throwing unexpected light on several obscure points of geology. His observations on the distribution of animal and vegetable life in different zones of the sea and land, have opened many new fields of research. Many of his best papers were written for the meetings of the

British Assoc. and other societies. Among his separate works, papers, and monographs, of which more than 200 are published, many copiously illustrated by his own beautiful drawings, are: *On the Distrib. of Pulmonif. Mollusca in Europe* (1838); *Malacol. Monensis* (1838); *Star-fishes* (1841); *The Radiata and Mollusca of the Ægean* (1843); *Travels in Lycia* (written in conjunction with Lieut. Spratt, 1846); *Naked-eyed Medusæ* (1847); *British Mollusca* (1853, 4 vols. 8vo, conjointly with S. Hanley); Map of *Homoiozoic Belts* (Johnston's *Phys. Atlas,* 1854); *Collection of Literary Papers by E. Forbes* (1855); etc. See *Memoir* by G. Wilson and A. Geikie, 1861.

FORBES, Edwin, American landscape and genre painter: b. New York 1839; d. Flatbush, L. I., 1895. He was a pupil of A. F. Tait, and became special artist for *Frank Leslie's Magazine* during the Civil War. The drawings which he made during that time are now in the war office at Washington, and are of historic value.

FORBES, Evelina Louisa Michell, English novelist; b. Tettenhall. She was married to Hon. Walter Forbes in 1888. Her published books include: *Fingers and Fortune* (1886); *Her Last Run* (1888); *Blight* (1897); *A Gentleman* (1900); *Dumb* (1901); *Unofficial* (1902).

FORBES, Harriette Merrifield, American writer: b. Worcester, Mass., 1856, Oct. 22. She was married to W. T. Forbes, 1884, Feb. 5. She has published: *The Hundredth Town* (1889); *The Diary of Rev. Ebenezer Parkman* (1899).

FORBES, James David, d.c.l.: principal of the United College in the Univ. of St. Andrews: 1809, Apr. 20—1868, Dec. 31; b. Colinton, near Edinburgh; grandson of Sir William Forbes, of Pitsligo. He studied in the Univ. of Edinburgh 1825–30, and was admitted to the Scottish bar; and was appointed, 1833, to the chair of nat. philosophy in the Univ. of Edinburgh. He was a member of numerous scientific societies, received the Royal and the Rumford medals from the Royal Soc. of London, and two Keith medals from the Royal Soc. of Edinburgh. In 1860, Forbes became principal of the United College in the Univ. of St. Andrews. Among his contributions to science are —the polarization of radiant heat by the tourmaline, and also by reflection (1836), and its circular polarization— discoveries forming some of the strongest proofs of the identity of calorific and luminous rays; the unequal polarization of heat from different sources (1844); the refrangibility of heat; the depolarization of heat; etc. This whole series of experimental results is of very high importance. His researches on the motion of glaciers—in *Travels in the Alps* (1843); *Norway and its Glaciers* (1853); *Tour of Mont Blanc and Monte Rosa* (1855); and *Occasional Papers on the Theory of Glaciers* (1859)—made him popularly known as undoubtedly the first to establish the great *fact,* that glacier ice moves in its channel like a

viscous fluid, the middle moving faster than the sides, and the upper portions faster than the lower: (see GLACIERS). In meteorology Forbes made advances in both theory and experiment. His *Life and Letters,* edited by Principal Shairp of St. Andrews, Prof. Tait of Edinburgh, and Mr. Adams Reilly, the Alpine traveller, was published in London 1873.

FORBES, JOHN: 1710–1759, Mar. 11; b. Petincrief, Scotland: soldier. He studied and practiced medicine a short time, was appointed lieut.col. in the Scotch Grays 1745, was a staff officer in the German war, became col. of the 17th foot and a quartermaster-gen. under the Duke of Cumberland, 1757, was appointed a brig.gen. in America 1757, Dec. 28, captured Fort Du Quesne, Penn., 1758, Nov. 25, and named the place Pittsburg in honor of the English prime minister, concluded treaties with the Indians on the Ohio river, and died in Philadelphia.

FORBES, Sir JOHN, D.C.L.: 1787, Oct. 18–1861, Nov. 18; b. at Cuttlebrae, Banffshire: Scotch physician. After studying at Aberdeen and Edinburgh, he entered the navy 1807 as assistant-surgeon, and continued till 1816. In 1817, he took the degree M.D. at Edinburgh and afterward practiced at Penzance and Chichester. In 1840 Forbes went to London, where he speedily obtained a large practice. He was knighted 1853 by the queen, to whose household he held the appointment of physician in ordinary, while he was physician extraordinary to Prince Albert. He was a fellow of the College of Physicians, and the Royal Soc. of London; and a member of numerous foreign societies. Forbes with Drs. Tweedle and Conolly, edited the *Cyclopædia of Practical Medicine* (completed in 4 vols. 1839); and founded, and conducted for 12 years, the *British and Foreign Medical Review.* To Forbes in great measure belongs the merit of introducing the use of the stethoscope in England, and of commending to British practitioners the art of physical diagnosis. In 1831, he published the first ed. of his translation of Laënnec's *Treatise on Auscultation;* and in 1838, when the fifth ed. appeared, the new method was already extensively used. He wrote also *Physician's Holiday* (1849), and *Sight-seeing in Germany and The Tyrol* (1856). His last professional work, *Nature and Art in the Cure of Diseases* (1857), contains a systematic exposition of his medical doctrines.

FORBES, JOHN COLIN, Canadian artist: b. Toronto, Canada, 1846, Jan. 23. He studied at the Royal Academy, London, England, and on the continent, and returning to Canada he became a successful landscape and portrait painter. Among his works are: *Foundering of the Hibernia; The Mount of the Holy Cross; The Glacier of Selkirk; The Lily;* and portraits of Gladstone, Sir John A. Macdonald, the Marquis of Dufferin, Lady Helen Blackwood, and Sir Charles Tupper.

FORBES, JOHN FRANKLIN, American educator: b. Middlesex, N. Y., 1853, June 13; d. 1905. He was gradu-

ated at the University of Rochester in 1878; and in 1885 was made president of the John B. Stetson University in Deland, Fla.

FORBES, JOHN MURRAY, S.T.D.: 1807, May 5—1885: dean Gen. Theol. Seminary of the Prot. Episc. Church. He graduated at Columbia College 1827 and the Gen. Theol. Seminary 1830; was asst. prof. of ancient languages in Trinity College, Hartford, a short time prior to receiving orders in the Prot. Episc. Church; became rector of St. Luke's Church, New York, 1834, and held the office of prof. of pastoral theol. and pulpit eloquence in the Gen. Theol. Seminary, and was a delegate from the diocese of New York to the Gen. Conventions of the church 1844–47. In 1847 the Gorham Controversy arose in England and caused a number of Anglican ministers to enter the Rom. Cath. Church. In 1849 Forbes took this course, not, as has been asserted, in company with the Rev. Drs. Newman and Manning, because the former made the change in 1845, after leading in the Oxford Movement, and the latter in 1851 in consequence of the Gorham case. Forbes became pastor of St. Ann's Rom. Cath. Church, New York, theologian of the Rom. Cath. bp. of S. C. in the Baltimore plenary council 1852, and of the bp. of Boston in that of New York 1854. He returned to the Prot. Episc. Church 1859; was restored to ministerial functions 1862, and was dean of the Gen. Theol. Seminary 1869–72. He received the degree D.D. from Columbia College, and S.T.D. from Pope Pius IX.

FORBES, STANHOPE ALEXANDER, English artist: b. Dublin, Ireland, 1857, Nov. 18. He was educated at Dulwich College and studied art at the Royal Academy Schools, and under Bonnat in Paris. Among his pictures exhibited at the Royal Academy are: *The Fish Sale; The Health of the Bride; By Order of the Court; The Salvation Army; Forging the Anchor.*

FORBES-ROBERTSON, JOHN, English art critic: b. 1822, Jan. 30: d. London 1903, Feb. 25. He was educated at the University of Aberdeen, went to London at 21, and after visiting various art centres devoted himself to literature and criticism. He has published: *The Great Painters of Christendom;* and lives of Gustave Dore, Rosa Bonheur, etc.

FORBES-ROBERTSON, JOHNSTON, English actor: b. London 1853, Jan. 16. He is the son of John Forbes-Robertson (q.v.) and has been prominent on the English stage since he was 21.

FORBID, v. *fŏr-bĭd* [*for*, and *bid* AS. *forbeodan*]: to prohibit; to command not to do; to obstruct. FORBID'DING, imp. prohibiting; hindering: ADJ. repelling approach; disagreeable; offensive: N. hindrance; opposition. FORBADE', pt. *-băd'*, did forbid. FORBID'DEN, pp. *-bĭd'n:* ADJ. prohibited; hindered. FORBID'DENLY, ad. *-lĭ.*—SYN. of 'forbid': to interdict; hinder; command; oppose; debar;

exclude;—of 'forbidding, a.': unpleasant; displeasing; abhorrent; odious; repulsive; repellent.

FORBID'DEN FRUIT: fanciful name, scarcely used in the United States, for the fruit of different species of *Citrus*. In the shops of Britain, it is a small variety of the Shaddock (q.v.) which generally receives this name. But on the continent of Europe, a different fruit, regarded by some as a variety of the orange, and by some as a distinct species (*Citrus Paradisi*) is known as the forbidden fruit, or Adam's Apple. Like some other fruits of the same genus, it was recently introduced into the south of Europe from China. The tree has broad, tapering, and pointed leaves, the leaf-stalks winged; the fruit is large, somewhat pear-shaped, greenish-yellow, of very uneven surface, having around its base a circle of deeper depressions, not unlike the marks of teeth, to which it probably owes its name. It is chiefly the rind which is the edible part; the rind is very thick, tender, melting, and pleasant, there is very little pulp; the pulp is acid.—The name forbidden fruit has been given also to the fruit of *Tabernæmontana dichotoma*, a tree of Ceylon, of the nat. ord. *Apocynaceæ*. The shape of the fruit—which is a follicle, containing pulp—suggests the idea of a piece having been bitten off, and the legend runs that it was good before Eve ate of it, though it has been poisonous ever since.

FORBORE and FORBORNE. See under FORBEAR.

FORCE, n. *fōrs* [F. *force*, strength, force: It. *forza*—from mid. L. *forcĭă*, or *fortĭă*, force—from L. *fortis*, strong]: active power; vigor; quantity of power produced by motion; violence; troops; a body of land or naval combatants; capacity of exercising an influence or producing an effect; power to persuade or convince; validness; power of law: V. to compel; to obtain by force; to coerce; to draw or push by main strength; to ravish; to storm; to hasten growth by artificial heat or other means; in *OE.*, to strengthen with soldiers; to endeavor. FOR'CING, imp.: ADJ. impelling; driving; ravishing: N. the act of one who forces; the act of urging on the growth of plants and fruits to maturity; the raising of plants by artificial heat. FORCED, pp. *fōrst:* ADJ. affected; overstrained; compulsory. FORCE'FUL, a. *-fûl*, driven with force; acting with power. FORCE'FULLY, ad. *-lĭ*. FORCE'LESS, a. having little or no force. FOR'CER, n. one who; the solid piston of a forcing-pump. FORCIBLE, a. *fōr'sĭ-bl*, having force or efficacy; active; powerful; weighty. FOR'CIBLY, ad. *-blĭ*. FOR'CIBLENESS, n. *-bl-nĕs*. FORCING-PIT, a covered frame sunk in the earth for accelerating the growth of plants. FORCE-PUMP, a pump for driving water onward, or throwing it to a distance. IN FORCE, or OF FORCE, valid; of full virtue; not suspended or reversed. OF NO FORCE, not valid; of no account. FORCIBLE ENTRY, taking or holding possession of real property through force or threat and without legal authority: it must be with such acts of violence or menace as imply some personal danger if resistance be offered—

thus a violence beyond that of mere trespass. A plea of ownership will not excuse the owner for entering on his property in other than a peaceable manner. Nor is it accepted as excuse that the entry was to enforce a lawful claim, or that the entry forcibly attempted was gained finally by entreaty. *Note.*—In *physics*, FORCE may be applied to any pulling, pressure, tension, friction, or repulsion, whether applied by a stick or string, a chain or girder, or by means of an invisible medium. FORCE may be defined to be 'that which produces or changes the state of rest or motion in a body; it is often confounded with *energy*.'—SYN. of 'force, n.': energy; activity; power; strength; might; stress; compulsion; constraint; vehemence; coercion; pertinency; validity; armament; troops; —of 'force, v.': to drive; coerce; compel; constrain; necessitate; oblige; impel; press; violate; wrest; extort; enforce; urge; stuff;—of 'forcible': cogent; impressive; efficacious; potent; mighty; strong; violent; impetuous; powerful; energetic.

FORCE, v. *fōrs* [F. *farcir;* L. *farcīrĕ*, to stuff: OE. *fors*, spice or seasoning]: in *OE.*, to stuff. FOR'CING, imp. FORCED, pp. *fōrst*, stuffed. FORCE-MEAT, *fōrs'mēt*, meat chopped fine, and highly seasoned for stuffing; in *OE.*, spiced, highly seasoned meat.

FORCE, n. *fōrs* [OE. *foss*, a waterfall—from Icel. *foss*, formerly *fors*, a waterfall: Sw. *frussa*, to gush: W. *ffrwd*, a torrent]: in *prov. Eng.*, a cascade; a waterfall; also spelled FORSE.

FORCE, in Physics: often used to denote the same as ENERGY, the power of doing work; though the two terms are not strictly synonymous—Force being, generally, that which tends to produce change in the state (whether rest or motion) of a body. Till we know what Matter (q.v.) is, *if there be* matter at all, in the ordinary sense of the word, we cannot hope to have any idea of the absolute nature of force. Any speculations on the subject only lead into a train of hypotheses entirely metaphysical, because utterly beyond the present powers of experimental science. If we content ourselves with a definition of force based on experience, such a definition will say nothing of its nature, but will confine itself to the effects which are said to be due to force, and in the present state of our knowledge it is almost preposterous, in a scientific statement, to aim at more.

Our first ideas of force are evidently derived from the exertion required to roll, or lift, bend, or compress, etc., some mass of matter; and it is easy to see that in all such cases where muscular contraction is employed, matter is moved, or tends to move. Force, then, we may say generally, is *any cause which produces, or tends to produce, a change in a body's state of rest or motion:* (see MOTION, LAWS OF:) (for one line of theory on this subject, see SUBSTANTIALISM). The amount or magnitude of a force may be measured in one of two ways: 1. By the pressure

it can produce, or the weight it can support; 2. By the amount of motion it can produce in a given time. These are called respectively the Statical and Dynamical measures of force. The latter is, as it stands, somewhat ambiguous What shall we take as the quantity of motion produced? Does it depend merely on the velocity produced? or does it take account of the amount of matter to which that velocity is given? Again, is it proportional to the velocity itself, or to its square? This last question was very fiercely discussed between Leibnitz, Huyghens Euler, Maclaurin, the Bernouillis, etc.; Leibnitz, being, as usual with him in physical questions, on the wrong side. Newton, to whom we owe the third law of motion, had long before given the true measure of a force in terms of the motion produced. This law is an experimental result —that when pressure produces motion, the *momentum* produced (see MOMENTUM) is proportional to the pressure, and can be made (numerically) equal to it by employing proper units. Hence momentum is the true dynamical measure of force which, therefore, is proportional to the *first* power only of the velocity produced. What is properly measured in terms of the *square* of the velocity, we shall presently see. For various properties of force, statical and dynamical, see COMPOSITION OF FORCES; COUPLES; CENTRE OF GRAVITY; CENTRAL FORCES; FALLING BODIES; MECHANICAL POWERS; VIRTUAL VELOCITIES.

It is obvious that in order to produce any effect at all, or to do WORK, as it is technically called (see WORK), a force must produce *motion*, i.e., must move its point of application. A weight laid on a table produces no actual result in *work* unless the table yields to the pressure, i.e., unless the weight descends, be it ever so little. We do no work, however much we may fatigue ourselves, if we try to lift a ton from the floor; if it be a hundred weight only, we may lift it several inches, and then we shall have done work—and it is evident that the latter may be measured as so many pounds raised so many feet—introducing a new unit, the FOOT-POUND, of great importance, as we shall shortly see, in modern physics: (see WORK). This is evidently, however, a statical measure of work, since no account is taken of velocity. Have we then for work, as we had for force, a *dynamical* measure? Let us take a simple case, where the mathematical investigation is comparatively very easy, and we shall find that we have. We know (see VELOCITY; MOTION; LAWS OF) that if a particle be moving along a line (straight or not), and the distance moved (in the time t) along the line from the point where its motion commenced be called s, its velocity is $v=\frac{ds}{dt}$. Also we know that the force acting on it (in the direction of its motion) is to be measured by the increase of momentum in a given time—this gives (as the last equation was obtained) $F=m\frac{dv}{dt}$. From these two

equations, we have, immediately, $mvdv = Fds$, or, as the rudiments of the differential calculus give at once, $\frac{mv^2}{2} = \int Fds = F.s$ if the force be uniform.

The quantity on the right-hand side is the sum of the products of each value of force by the corresponding space ds, through which the particle moved under its action. It is therefore the whole work done by the force. On the left hand, we find half the product of the mass, and the square of the velocity it has acquired; in other words, the vis-viva. Hence, in this case, the vis-viva acquired *equals* the amount of Work (q.v.) expended by the force.

It appears from a general demonstration (founded on the experimental laws of motion, and therefore true, if they are), that if, in any system of bodies, each be made up of particles or atoms, and if the forces that these mutually exert be in the line joining each two, and depend merely on the distance between them, then we can express the required proposition in the following form:

Any change of vis-viva in the system corresponds to an equal amount of work gained or lost by the attractions of the particles on each other.

What is spent, then, in work, is stored up in vis-viva; and conversely, the system, by losing some of its vis-viva, will recover so much work-producing power. If we call the vis-viva, as is now generally done, *Kinetic Energy*, and the work-producing power *Potential Energy*, we may express the above by saying, that in any system of bodies where the before-mentioned restrictions are complied with, *the sum of the kinetic and potential energies cannot be altered by the mutual action of the bodies.* The most simple and evident illustrations of this propositon are found in the case of the force known as gravitation. The potential energy of a mass on the earth's surface is zero, because not being able to descend, it has, in common language, no work-producing power. If it be raised above the surface, and then dropped, it is easy to see that the work expended in raising it will be exactly recovered as vis-viva after its fall. For (see Falling Bodies) a mass falling through a space, h, to the earth acquires a velocity v, such that $v^2 = 2gh$, or if m be the mass, $\frac{mv^2}{2} = mg.h.$ The left-hand side gives the vis-viva acquired by the fall—the right is the product of the weight (mg) and the height fallen through—or is the work required to elevate the mass to its original altitude.

Hence we may calculate the amount of work which can be obtained from a *head* of water in driving water-wheels, etc., remembering, however, that there is always a *loss* (as it is usually called) due to friction, etc., in the machinery. That there is a loss in useful power, is true, but we shall find presently that in energy there is none, as indeed our general result has already shown. *Where* the apparently lost energy goes, is another question. Another

good example of potential energy is that of the weights in an ordinary clock. It is the gradual conversion of potential into kinetic energy in the driving weight which maintains the motion of the clock, in spite of friction, resistance of the air, etc.; and we have in the kinetic energy of sound (which depends on vibrations in the air) a considerable portion of the expended potential energy of the striking weight. A coiled watch-spring, a drawn bow, the charged receiver of an air-gun, are good examples of stores of potential energy, which can be directly used for mechanical purposes.

The chemical arrangement of the different components of gunpowder, or gun-cotton, is such as corresponds to enormous potential energy, which a single spark converts into the equivalent active amount. But here, *heat* has a considerable share in the effects produced; it may then be as well, before proceeding further, to consider how we can take account of it, and other (so-called) physical forces as forms of energy.

Correlation of Physical Forces.—So far as we yet know, the physical forces may be thus classified: I. Gravitation (q.v.); II. Molecular Forces—Cohesion (including Capillarity), Elasticity, Chemical Affinity; III. Heat and Light; IV. Electricity (including Magnetism); V. Animal Force; VI. Vital Force, having, as some irrationally suppose, an analogue in inorganic masses, which may be called Crystalline Force. (This notion is examined further on.) Of these, I., II., and some forms of III., are more immediately connected with *matter* than the others—that is to say, that the remainder almost necessitate the hypothesis of the existence of some medium unlike ordinary matter, or, in popular language, an *imponderable*. The almost universal opinion of physicists, however, seems to be, that even the former must be accounted for in some such way. Newton, in his second letter to Bentley, says, with respect to gravitation (and it is obvious that similar language is applicable to molecular forces generally): 'You sometimes speak of gravity as essential and inherent to matter. Pray, do not ascribe that notion to me, for the cause of gravity is what I do not pretend to know.' And again in the third letter: 'It is inconceivable that inanimate brute matter should, without the mediation of something else, which is not material, operate on, and affect other matter without mutual contact, as it must do, if gravitation, in the sense of Epicurus, be essential and inherent in it; and this is one reason why I desired you would not ascribe innate gravity to me. That gravity should be innate, inherent, and essential to matter, so that one body may act upon another at a distance through a *vacuum*, without the mediation of anything else, by, and through which their action and force may be conveyed from one to another, is to me so great an absurdity, that I believe no man who has in philosophical matters a competent faculty of thinking, can ever fall into it. Gravity

must be caused by an agent acting constantly according to certain laws; but whether this agent be material or immaterial, I have left to the consideration of my readers.' Of what that medium may consist, we cannot, of course hazard even a conjecture; but if it be composed of separate atoms—i.e., not continuous—it is evident that a second medium will be required to help the particles of the first to act on each other (for without this, the first medium would be merely obstructive), and so on. This must stop somewhere; why not, then, at the first? But in the present state of our knowledge of mechanics, a continuous medium is barely conceivable, and its motions, etc., present considerable difficulties to even plausible mathematical treatment. If we take the view opposed to Newton's, as Mosotti and others have done (their ideas are considered further on) we can, in a very artificial manner, however, account for gravitation and molecular action; but, as before said, the foundations of this attempt at explanation are hardly tenable.

Just as sound depends on the elasticity of the air and vibrations thereby maintained and propagated, light and radiant heat, which are certainly identical, most probably consist in the vibrations of some very elastic fluid. This has been provisionally named Ether (q.v.). If it be continuous, it may help us to account for the first two categories of force also, as we have already seen; if not so (which is more likely) fresh difficulties arise. Light and heat, however, undoubtedly depend on motion, and correspond, therefore, to so much vis-viva or actual energy. Even heat in a liquid or solid body must correspond to some vis-viva in the material particles, since a hot body can give out both light and heat, and a body may be heated by luminous or calorific rays which are vibratory, as we have seen.

Class IV. contains perhaps the most puzzling of all these forces. That there is something in common in all the forms of electricity, and that magnetism is nearly related to them, is certain; it is probable, also, that frictional electricity, when statical, consists in something analogous to a coiled spring, or is a form of potential energy—the others being forms of kinetic energy. Some have supposed magnetism to be also a form of potential energy but Ampère's discoveries have materially lessened the probability of the truth of this hypothesis. We shall consider this again.

Class V. may be deferred for the present.

As to Class VI., it seems, from the observations of physiologists as to the formation of cellular matter, and the production in living organisms of compounds which have not yet been made by ordinary chemical processes, that the vital force if there be such, is not a force which does work, in the mechanical sense of the term, but merely *directs*, as it were, the other natural forces *how to apply* their energies. Were a railway train running on a smooth horizontal line of rails, it would retain for ever its original velocity; but in

turning a curve, it would be acted on by deflecting forces, without which its path would be straight. These forces *do no work*, as is evident, since this would be shown in alteration of the vis-viva, and none takes place. They modify, however, the direction in which the train moves.

When gangs of laborers and masons are at work building an edifice, the former are employed raising stones, mortar, etc., the latter in laying them; but there is present an overseer with a plan, who doing no (mechanical) work himself, guides and directs the proper application of force by the working body. In this view of the case, the laborers are the physical forces, and the overseer the vital force. It is certain that the so called crystalline force cannot properly be put in this category, as presenting even an analogy, however slight; it is probably an effect, not a cause, and due to the different forms of simple or compound particles of matter, and the consequent variations in their molecular forces in different directions.

So far, then, for the possible nature of the forces, which, with the probable exception of VI., certainly depend on various forms of energy. Can these be transformed one into another, as the different kinds of mechanical energy can?—Take the potential energy of gravitation to begin with. We can employ it to drive a water-wheel. This turns a shaft, to which, if a tight brake be applied, heat will be produced by friction, and light also, if a rough wheel on the shaft be made to rotate against a piece of flint or pyrites; or electricity may be produced by employing the moving power to turn an ordinary electrical machine, or a magneto-electric one; and from the electricity so produced, electrical charges and currents may be derived; from them heat and light again. Or the currents may be employed to magnetize a needle or a piece of soft iron, or to produce chemical decomposition.—Heat may be employed by means of a steam-engine as a substitute for the water-power or potential energy of gravitation, and the above effects be produced. It may be employed also in raising weights, and therefore in producing the potential energy in question; or it may be employed to produce Thermo-electric Currents, and thence all the ordinary effects of electricity, including the motion of a magnetic needle.—Light may be employed to produce chemical combination or decomposition, as in photography, it may by the same means be made to produce electric currents, and consequent *motion* of a needle. It is not yet proved that light can produce magnetism *directly*, though there can be little doubt that, if properly applied, it is capable of doing so. Chemical action in a voltaic battery can be made to produce motion, heat, light, electricity, electrical charges and magnetism, and to overcome other chemical affinity.—Capillary action has been employed to produce electricity, and mechanical effects, etc., but we need not go through the whole category.

In these experimental results, then, consists what is called the Correlation of the Physical Forces—i.e., the

transmutability of one of the latter into another or others. The idea is old, but the proofs of its truth have become numerous only within the last half-century. See Grove's excellent treatise for further detail on this interesting subject.

Conservation of Energy.—But a far more important principle, being, in fact, the *precise* statement of the preceding—which is somewhat vague—is that of the Conservation of Energy. It is simply the extension (to all physics) of the principle given in full, and proved in a particular case, at the beginning of this article—i.e., that the sum of the potential and kinetic energies of any set of moving bodies cannot be altered by their mutual action. Let us now suppose heat, light, etc., to consist in the energy of vibratory movements of particles, and in their relative states of distortion, etc., and make the supposition that these particles act on each other—no matter by what means—in the line joining each two, and with forces which depend on their distance, and we have at once the theorem, that the sum of the potential and kinetic energies is a quantity unalterable in any system, save by external influences. Hence, when mechanical power is said to be lost, as it is by the unavoidable friction in machinery, etc., it is really only changed to a new form of energy—in general, heat. Thus, when a savage lights his fire, he expends animal energy in rubbing two pieces of dry wood together. If these pieces of wood were not in contact, no force would be required to move them past each other—more and more is required as they are more strongly pressed together. The equivalent of the energy so expended is found in the heat produced. Davy showed that two pieces of ice might be melted by rubbing them together. A skilful smith can heat a mass of iron to redness by mere hammering. Here the energy actually employed is partly given out in the shape of heat, and partly stored up in the iron as potential energy due to the compression of the mass, or the forcible approximation of its particles. Among the earliest, and certainly the *best* experiments on this subject, are those of Joule (q.v.). He determined the relation between the units of heat and potential energy of gravitation, by various methods, which gave very nearly coincident results. One of these was as follows: A paddle-wheel is so fixed as to revolve in a closed vessel full of water. The wheel is driven by the descent of a known weight through a measured space, and precautions are taken against losses of energy of all kinds. The water agitated by the paddle-wheel comes soon to rest, as we know; but this is due to friction between its particles: and the final result is the heating of the water. The quantity of water, and also the number of degrees by which its temperature is raised, being measured, a simple proportion enables us to find how many foot-pounds (see FOOT-POUND) of mechanical energy correspond to the raising by one degree the temperature of a pound of water. The result is,

that the heating of a pound of water one degree Fahrenheit is effected by 772 foot-pounds—and this number is called *Joule's Equivalent*. In other words, if a pound of water fall to the ground through 772 ft. and be then suddenly arrested, its temperature will be raised one degree; and, conversely, the heat that would raise the temperature of a pound of water one degree, would, if applied by a steam-engine or otherwise, raise 772 pounds one ft. high. Now (see HEAT), we know the amount of heat produced by the burning (in air) of any material whose composition is known. It follows, then, that from the mere quantity and composition of a substance, we can tell the amount of mechanical work due to its combustion; that is, supposing it all to be effective. As we have been led to the mention of heat of combustion, let us consider what this is due to. Combustion (in air) is merely a chemical combination of the constituents of the burning body with oxygen—the heat and light which are developed are therefore, by the conservation of energy, equivalent to the excess of potential energy of the uncombined, over the combined, oxygen and combustible.

That this is the real state of the case—and that the original setting fire to the combustible has nothing to do with the matter, as it is frequently imagined—will be made evident by considering any spontaneous combination, say that of chlorine and copper filings, or of mercury and sodium etc., in which cases the potential energy lost by the compound appears as heat, light, and sometimes sound.

The equivalents of the other forms of energy have not been even approximated to, with the exception of that of light. Thomson has determined the energy of a cubic mile of sunlight at the earth to be somewhere about 12,000 *foot-pounds*, giving about 10,000 as the *Horse-power* (q.v.) of each sq. foot of the sun's surface. There are some additional difficulties in the way when we seek the equivalent of electric energy, for here the question arises: 'Is there a special substance which is, or the energy of whose motions is, electricity, or does it depend upon motions and distortions of the luminiferous ether?' for we can scarcely suppose it due to motions of the particles of *matter*. If the first, we have as yet no means of estimating its energy; if the latter, we may consider it as within the reach of experiment. It may be remarked here, that Weber's exquisite theoretical statement of electric laws—resting on the fundamental assumption that there are two *electric fluids*—requires the admission of mutual forces, which vary with the relative velocity of its particles, and for which, therefore, the conservation of energy does *not* necessarily hold.

Helmholtz, in an admirable paper (*Ueber die Erhaltung der Kraft*, translated in Taylor's *Scientific Memoirs*, New Series, i.), starting from the assumptions above explained, has applied the principle of conservations of energy to the investigation of many recondite problems connected with the physical energies: such of his observations as suit the plan of this article are here given.—A very good example

of the conservation of energy is found in the increasing velocity of a planet or comet as it approaches the sun, and thus loses potential energy; and also in the fact that in the case of these bodies the mere distance from the sun, and the velocity at that distance, enable us to tell at once the nature of the orbit described—i.e., which of the conic sections it is.—Latent heat is probably a form of potential energy; depending on the physical state of the substance in which it is stored up. The same may be said of those substances, which, when mixed, produce heat or cold, as water and sulphuric acid, or nitrate of ammonia. It is easily seen that here the heat or cold depends upon a change of molecular arrangement of some kind; that is, a change of the potential energy.—In magnetism and statical electricity, of course, the conservation of energy holds, as we know that all the phenomena can be explained by attractions and repulsions, following the law of gravitation. In the discharge of a Leyden battery, the potential energy lost is reproduced as heat in the connecting wires, and as light, heat, and sound with the disruptive spark. In charging a Leyden jar by means of the electrophorus, the charge is directly produced by the expenditure of mechanical work in overcoming the attraction of the negative electricity of the resinous plate for the positive electricity of the cover.—In the ordinary voltaic battery, the excess of loss of potential energy in the cells by the chemical union, say of zinc and oxygen, and of sulphuric acid and oxide of zinc, over that gained by the decomposition of water, produces the kinetic energy of the current, which may be transformed into heat, light, magnetism, or motion, or two or more. Or it may be employed to reproduce potential energy by chemical decomposition, say that of water. This, by a spark, can be reconverted into kinetic energy as an explosion accompanied by heat, light, and sound. While an electric current causes the motion of a magnetized needle, our general principle should lead us to infer that the current itself will be weakened. This is found to be the case, but, as it should be, *only during the motion* of the needle. The needle in a permanent state of deflection produces no effect whatever. Now, the diminution of an electric current is simply equivalent to the addition of a weaker current passing in the opposite direction. We should expect, then, that the motion of a magnet near a conducting wire will in general produce a current in the latter, and this is, in fact, Faraday's great discovery of magneto-electric induction. In this case, the current ceases so soon as the magnet ceases to move relatively to the wire.

If a mass of copper or other good conductor be set in rapid rotation near a powerful magnet, the motion produces electric currents in the copper, which, being attracted by the magnet, soon bring the mass to rest. It is not so clear in this case into *what* the mechanical energy of the rotation has been transformed, especially as the electric currents cease with the motion; but if we keep up the

rotation forcibly, we find in a short time the copper growing warm; in other words, the energy has been transformed into electric currents, and the latter into heat. This beautiful experiment is due to Joule, and has been repeated in a striking popular form by Foucault.

Advantage has been taken by Faraday of the phenomena of induction, to produce electric currents by aid of the earth's magnetism. His apparatus is simply a revolving disk of metal, and the terminal wires touch, one its axis, the other its edge. The energy which is here transformed into electric currents is the additional effort requisite to turn a *conducting* disk, instead of an equal *non-conducting* one. It is a curious consequence that in all metallic machinery a portion of the energy of the prime mover is lost in producing electric currents, and finally heat, in the moving parts, so that heat in such cases is not entirely, though very nearly, due to friction alone.—Perhaps one of the most singular of these transformations of energy is that already referred to of heat into electric energy. Certain crystals, such as tourmaline, become electrified by heat; but electric *currents* can be produced by simply heating a *junction* of two wires or bars of different metals, the other ends also being in contact. Now, if we were to heat the other junction, it is obvious that, as at it the metals are arranged in the opposite order, we should produce a contrary current; conversely, by cooling them we should strengthen the first. But the conservation of energy requires that such a junction should be heated or cooled according to the direction in which a current passes through it. This was discovered by Peltier.

Animal energy is simply a transformation of the potential energy of food. This is well illustrated by the increased diet requisite when man or beast abruptly changes from a state of inactivity to one of toil, as with a polar bear after his winter's sleep; or by the greater amount and better quality of food necessary for criminals subject to hard labor, than for those merely imprisoned.

Since, then, as far as we have yet seen, there is no such thing as gain or loss of energy anywhere, while it appears that the ultimate transformation of such energy is heat, and that the latter tends to a uniform diffusion or dissipation, in which it is unavailable, as far as we know, for further transformation (see HEAT), whence do we procure the supplies of energy requisite to maintain the economy of life? We answer: Chiefly, or indeed entirely, from the sun, whence they come as light and radiant heat, perhaps in other forms. Without the sun, where would be vegetation?—without vegetation, where animal life? Where would be our stores of fuel, whether wood or coal? It is entirely then, we may say, to the directly supplied energy of the sun that we look for the maintenance of life; and this leads to a question not of much importance to ourselves, to be sure, but of vast future consequence to the human race: Is this supply finite? Will the sun in time have given off all its energy, or is it continually receiving

accessions itself, and if so, has it an inexhaustible store to draw from? Now, whether the sun be a hot mass, or be surrounded by an atmosphere in an intense state of combustion, or whether it derive the main part of its heat, as Thomson supposes, from gravitation (in a way presently to be considered), it is certain that, as far as we know, it must at some period be exhausted. Such is the apparently inevitable verdict of the conservation of energy. The gravitation theory of the origin of energy generally may be given in some such form as this: The matter in the universe, in a state of coaser or finer division, originally filled all space, and possessed, therefore, by virtue of gravitation, a certain amount of potential energy. As particles gradually moved up to each other, and became slowly agglomerated into masses, more and more of this energy was realized in its kinetic form; some as heat (that of the sun, or the internal heat of the earth, etc.), some as vis-viva of axial or orbital rotation, etc. There still remains unagglomerated in space (see ZODIACAL LIGHT; AEROLITES; COMETS; NEBULÆ) much of this original matter still falling mainly toward the larger masses, as the sun and stars, and exchanging its potential for kinetic energy. But the latter, as we have seen, tends ultimately to become heat, and to seek a uniform diffusion. This then, it appears, is to be the last scene of the great mystery of the universe—chaos and darkness as 'in the beginning.'

An immediate consequence of the truth of the conservation of energy is the impossibility of what is usually understood by the Perpetual Motion (q.v.); for it is to be carefully remembered that perpetual motion, in the literal sense of the words, is not only possible, but very general. If there were no such thing as friction, or if we had a perfectly smooth body, in the form of a teetotum, for example, it would spin for ever in vacuo with undiminished speed. The earth in its axial rotation affords a good example. Were it a perfect sphere, and of uniform material, the other masses of the system could produce no effect whatever on its rotation, and the latter would remain for ever unchanged. And even, as we have already seen, when one form of kinetic energy, as electricity, or ordinary vis-viva, is lost, we find it reappearing in other forms of kinetic energy, such as heat and light. But this is not the technical acceptation of the term, 'the perpetual motion;' it is popularly understood to mean a source of motion which will not only preserve its own vis-viva unchanged, but also *do work*. This is, of course, incompatible with the conservation of energy, for wherever work is done, equivalent energy in some form or other is consumed. The ordinary, attempts to obtain 'the perpetual motion' which are still being made in hundreds by visionaries, are simply absurd, based as they are for the most part on ignorant applications of mechanics. There is absolute impossibility here; and a 'perpetual motionist' of the common herd is far more infatuated than a 'squarer of the circle;' for the latter's problem *may* conceivably be solved, though cer-

tainly not by the means usually employed, or in the form usually sought for.

The chief *theories* of the various forms of energy which have been advanced of late times, all assume at the outset forces of attraction or repulsion between particles; or else a highly elastic fluid, or rather solid, if we may so call it, in which the particles of matter float, or are imbedded. We have already considered the difficulties attending the latter supposition; but it is the only one which does not refer force back to force, thus apparently leaving the question where it found it. We may dismiss it with the remark, that a fluid or quasi-solid absolutely continuous and alike in every part is difficult to conceive; and it is hard to understand how motion can be propagated through it. If it be not continuous, forces must be supposed to be exerted by its parts on each other, else the motion of one part would not affect the others. There is one way in which the latter difficulty has been attacked, which seems plausible enough; and that is, that the particles of this fluid are in a state of rapid motion, and continually impinging on each other and on the particles of matter, no forces being exerted except those of pressure at the impact. This is the notion of Le Sage. But, unless these particles be supposed *elastic*, their motion would be lessened at every impact, and destroyed completely if the impact were direct. This objection seems very strong. The first-mentioned theory, that of Epinus and Mosotti, assumes that material particles float in a general atmosphere of ether, that the particles of each repel one another, but that a particle of matter attracts one of ether. From these suppositions, and an hypothetical law connecting pressure with density in such an ether, Mosotti has deduced gravitation and the molecular forces; but to apply the hypothesis to the other physical energies, other suppositions are necessary. These have been supplied by Clausius and Redtenbacher, who, with the assumptions of particles of matter and of ether as before, imagine those of matter to attract each other, and also those of ether, but the latter to be mutually repulsive. Light and radiant heat, according to this theory, are vibrations of the ether which fills all space between the particles of matter, or rather, between the atmospheres of ether which, by the foregoing assumptions, the particles of matter will collect about them. Heat consists of vibrations of the molecules of matter, or of the groups of atoms (see Atomic Theory) of which the molecule of a compound body is built up, together with their atmospheres. Electricity, magnetism, etc., are explained to be rotations in the atmospheres. Redtenbacher and Clausius are not quite agreed as to the physical energies corresponding to each of these forms of motion, but the above gives a general idea of the nature of their speculations.

Probably the most startling of all reflections ever made on force, and its ultimate nature, are those of Faraday. Without calling in question in ordinary cases the truth of

the conservation of energy, he has endeavored, by experiment (the only genuine test in a question so novel and so profound), to prove what may be called the Conservation of Force. Here we understand *force itself* and *not energy*. He argues thus: Two masses, according to the undisputed law of gravitation, attract with four times their mutual force if their distance be diminished to half; and with only one-fourth of the same, if their distance be doubled. He asks *whence* comes the additional force in the former, and *what becomes of* the lost force in the latter case? Now, it is evident that this is a new question, totally distinct from any that we have yet considered. To answer it, we must know *what* force is. Would gravitation have any existence if there were but one particle of matter in the universe, or does it suddenly come into existence when a second particle appears? Is it an attribute of matter, or is it due to something between the particles of matter? Faraday tried several experiments of an exceedingly delicate kind, in order to find some answer to his question. A slight sketch of one of them must suffice. A pound-weight is not so heavy at the ceiling of a room as it is when on the floor; for, in the former case, it is more distant from the mass of the earth than in the latter. The difference for a height of 30 ft. is (roughly) about $\frac{1}{350000}$ of a pound. Now, if a mass of metal be dropped through such a space an additional force, $\frac{1}{350000}$ of its weight, is called into play, and the object of the experiment was to detect whether electrical effects accompanied this apparent *creation* of force. The mass, therefore, was a long copper wire, whose coils were insulated (see ELECTRICITY) from each other, and whose extremities were connected with those of the coil of a delicate Galvanometer (q.v.). Had any trace of an electric current been produced, the needle of the galvanometer would have been deflected, but, when all disturbing causes were avoided, no such deflection was detected. Other experiments with a view to the detection of other physical energies, were also tried, but, like the first, with only negative results.

We must not hastily conclude that there is such a *thing* as force, though we are in the constant habit of speaking about it. Our sensations are all more or less misleading until we can interpret them. The pain produced by a blow is quite a different thing from the energy of motion of a cudgel; and when our muscular sense impresses on us the idea that we are exerting force, we must be cautious in our conclusions. For it is certain that force is *merely the rate per unit of length* at which energy is transferred or transformed. (See CONSTITUTION OF MATTER.)

There are, in mechanics, several other quantities which retain a fixed value under certain circumstances: the following are a few of them.

Conservation of Areas. Invariable Plane.—We have seen (CENTRAL FORCES) that if a particle move about a centre of force, its motion is confined to a plane, and its radius vector traces out equal areas in equal times. Similar theo-

rems hold in any system of particles acted on only by their mutual attractions. If in such a system we suppose the positions of the respective particles to be continually projected (orthogonally, see PROJECTION) on *any* fixed plane, and radii vectores to be drawn from *any* point in that plane to the projections—*the sum of the areas swept out by all those radii vectores will be equal in equal times.* Also, this being true of all planes, there is one for which this sum is a maximum, and *this plane is fixed in space.* It is thence called the invariable plane of the system. Similar propositions hold for a system of bodies each of finite size, their several axial rotations being taken into account; hence what is called the Invariable Plane (q.v.) of the Solar System.

Conservation of Momentum.—When two masses attract or impinge, the forces that they exert on each other are evidently equal and opposite. Now, the measure of a force is the momentum that it produces; hence equal and opposite momenta, in addition to their original quantities, will be communicated to the masses, and therefore the sum of the momenta of the two, resolved in any direction, will be unaltered; hence, *the sum of the momenta of any number of bodies will be unaltered by mutual actions either of the nature of attraction or impact.*

Conservation of the Motion of the Centre of Gravity.—Again, in such a system, the momentum of the whole collected at its centre of inertia, resolved in any assigned direction, is the sum of the momenta of the separate bodies in that direction; hence, *the centre of inertia of a system, subject to none but the mutual actions of its components, either remains at rest or moves uniformly in a straight line.*

Consult, Mach, *Principles of Mechanics;* Pearson, *The Grammar of Science;* Ziwet, *Elementary Treatise on Theoretical Mechanics.*

FORCE, COERCIVE. See COERCIVE FORCE.

FORCE, ELECTRO-MOTIVE. See ELECTRO-MOTIVE FORCE.

FORCE, LINES OF. See MAGNETISM.

FORCE, MAGNETO-MOTIVE. See MAGNETISM.

FORCE, MANNING FERGUSON, American soldier and author: b. Washington, D. C., 1824; d. 1899. He was the son of Peter Force (q.v.). He was graduated at Harvard College 1845 and at the Harvard Law School, entering the army in the Civil War as major of the Twentieth Ohio Volunteers, and attaining the rank of brevet major-general of volunteers. He was judge of the court of common pleas of Hamilton County, Ohio, 1867–77, and judge of the superior court of Cincinnati 1877–8. He published: *From Fort Henry to Corinth* (1881); *Marching Across Carolina* (1883); *Personal Recollections of the Vicksburg Campaign* (1885); etc.

FORCE, PETER, American historian: b. near Little Falls, N. J. 1790, Nov. 26; d. Washington, D. C., 1868, Jan. 23. His life work, entitled *American Archives,* a valuable

collection of 22,000 books and 40,000 pamphlets, was bought by the government (1867) and placed in the library of Congress. He published also: *Grinnell Land: Remarks on the English Maps of Arctic Discoveries in* 1850–1 (1852); and *Notes on Lord Mahon's History of the American Declaration of Independence* (1855).

FORCE AND FEAR: in *law*, working invalidation of contracts. As consent is of the essence, or rather is the essence of all contracts, and as consent implies not only intelligence, but unfettered power of action in the consenting parties, contracts, by the laws of all civilized nations, will be invalidated if it shall be proved that they were entered into under the influence of force or fear. Circumstances which constrain the will have the same effect as those which blind the understanding, and the law of force and fear is consequently closely analogous to that of Fraud (q.v.), including under that head misrepresentation, concealment, and consequent Error (q.v.). But it is not every degree of constraint, however exercised, which will have this effect in law. On the contrary, it must be of such a description as may be reasonably supposed to influence the will of the party in the circumstances in which he is placed at the time. In determining, therefore, whether there really has been force or fear in the legal sense, the law will take into account the age, sex, education, and other personal characteristics of the party, with the accidental circumstances in which he was placed, e.g., the state of his health and spirits at the time, whether he was alone, what anxiety he may have felt for the life or interest of others, and the like. As a contract invalid on the ground of force and fear is not only incapable of being enforced after its invalidity has been ascertained by legal process, but from the absence of consent was invalid *ab initio*—i.e., was no contract at all, in a legal sense, the object of the law is to restore the parties to the position in which they were before it was entered into. All moneys which have been paid under the provisions of the extorted contract must consequently be repaid, and reparation as far as possible must be made by the payment of damages for such personal injuries as the party who was dragged into it may have suffered from the enforcement of its provisions: see Reduction.

FORCELLINI, *for-chĕl-lē'nē*, Egidio: 1688, Aug. 20—1768; b. in a village near Padua: Italian philologist. Owing to the poverty of his family, Forcellini had not the benefit of early instruction, and was already verging toward manhood when beginning a regular course in the seminary of Padua. There he was notable for industry and quickness in learning, and was chosen by the learned principal, Giacomo Facciolati to aid him in the compilation of a lexicon, a work which probably inspired both with the project on which Forcellini's literary repute is based—viz., the compilation of a vast and comprehensive vocabulary of the Latin language. The work, published after Forcellini's

death, was one of the most valuable acquisitions to philological science of the age. In addition to the Italian and Greek signification of the Latin word, the literal and figurative application of each expression is given in a collection of examples, in themselves a perfect compendium of knowledge embracing the customs, laws, arts, sciences, religion, and history of the Romans. This immense work was published in 4 vols., folio, under the title, *Totius Latinitatis Lexicon, consilio et cura Jac. Facciolati, opera et studio Aeg. Forcellini Lucubratum* (Padua, 1771). Furlanetto's appendix appeared 1816 (Padua), and a new ed. of the complete work was published 1828 (Padua).

FORCENÉ, in Heraldry: applied to a horse when rearing or standing on his hinder legs.

FORCEPS, n. *fŏr'sĕps* [L. *forceps*, a pair of tongs—from *foris*, out of doors, without; *capĭō*, I take: It. *forcipe:* F. *forceps—lit.*, the thing for taking forth or out]: kind of pliers or small tongs used in *surgery*, etc.; an instrument of great antiquity, used as a substitute for the fingers, and consisting of two levers of metal jointed together crosswise, nearer to one end than to the other. The hand grasping the longer ends of the levers or handles, closes the shorter ends which are shaped so as to seize firmly the intended object. There is hardly a surgical operation in which it is not applied; and it is made of various forms, to suit different cases. In addition to the forms used in dentistry there is e.g., the *dissecting* forceps, which has roughened points, to lay hold of small portions of tissue which are to be divided by the knife; the *lithotomy* forceps, again, has blades concave like spoons; and *fenestrated* forceps have apertures in the blades, and as the soft tissues project into these, a firm hold is obtained with less risk of tearing the parts. By means of Liston's *cutting* forceps, a powerful hand can divide a great thickness of bone. But the most important of all is the *midwifery* forceps, an invaluable invention, in cases of difficult delivery, which daily rescues from suffering and danger numerous mothers and infants. It was gradually brought to its present perfection; but the name of Chamberlen, an accoucheur of the time of James II., is associated with it, as one of its chief improvers. It consists of two concave fenestrated blades, forming a cavity into which the head of the child fits. The blades are applied separately, one to each side of the head, and then locked together. Holding by the handles, the accoucheur aids the natural efforts of labor. The instrument does not necessarily or usually injure either mother or child. FORCIPATED, a. *fŏr'sĭ-pā-tĕd*, formed to open like a pair of pincers. FOR'CIPATE, a. *-pāt*, pincer-shaped.

FORCER, n. *fŏr'sẻr* [OF. *forcier*—from mid. L. *forsārĭŭs*, coffer]: in *OE.*, a strong box for valuables; a safe.

FORCING, in Gardening: hastening the growth of plants by artificial means; employed principally in the early spring to enable the gardener to supply various edible plants sev-

eral weeks earlier than they could be grown in the open field. Forcing is applied mostly to garden vegetables and flowers, but some of the small fruits, as the strawberry, are sometimes forced into early bearing. The principal means for forcing adopted by gardeners, are the cold-frame and the hotbed. The former consists of a sloping frame or box (located in a sheltered place and covered with glass), in which seeds can be sown some weeks earlier than in unprotected situations. In the hot-bed (see HOT-BED,) owing to the heat generated therein, seeds may be planted still earlier. The sowing may be done in shallow boxes which have been filled with fine, rich earth, or in the surface-soil of the bed itself; the former method is preferable. Among the principal plants which are forced for the market are the beet, cauliflower, early cabbage, and lettuce. A little later in the season the tomato, egg-plant, and cucumber also can be forced advantageously. The time for sowing varies with the latitude and the plants to be grown. In the Middle States sowing in hot-beds can be commenced early in Feb., and in cold frames by Mar. 1. In forcing plants constant care is required to prevent injury, by either of the extremes of too close an atmosphere or too low a temperature. Fresh air must be occasionally given or the plants will rapidly increase in height, but be lacking in vigor and hardiness; while if too cold air is admitted, or the glass is raised too long, the plants will be injured or destroyed by the exposure. In very cold weather the sashes should be covered with straw or matting and the sides banked with earth. It is desirable to transplant into other boxes, or other portions of the bed at least once, and a gradual 'hardening' of the plants by exposure to the outside air must be effected before they are placed in the open field.

FORD, n. *fōrd* [Ger. *furt;* Icel. *brot;* Pol. *brod,* a ford]: part of a river or other water so shallow that it may be passed without floating or swimming; a place established for such crossing—often becoming part of a town-name; e.g., Oxford, Stratford, Deptford, Hungerford, etc., English towns built around ancient fords. In selecting the safest place for fording a river, the *widest* part should be chosen, as, wherever a certain quantity of water is flowing, the wider its bed—the rapidity of the flow being the same—the shallower it must be. At the bend of a river, the line of shallow water does not run straight across, but extends from a promontory on one side to the nearest promontory on the other. The stream usually runs deep along hollow curves, and beneath steep perpendicular and overhanging banks, while it is shoal in front of promontories unless the promontory is formed by a jutting rock. For safe fording on foot, the depth of water should not exceed three ft.; on horseback four ft.; or a foot less for each, if the current be very strong. The bottom of a ford should be firm and even; weeds, blocks of stone, etc., are serious obstacles, especially for cattle. When a caravan, a number of troops, or of cattle have to cross, a sandy bot-

tom is very bad, for the sand is stirred up and carried away by the stream and renders the ford impracticable for the hindmost. For a small party, hard sand or gravel is the safest bottom. Fords are continually varying, either from the swelling of the river or the shifting of its bed or banks; and the place reported by one traveller as a safe ford, is not certain to be found so by the next. Residents near should be consulted. FORD, v. to pass over a river by wading or walking. FORD'ING, imp. FORD'ED, pp. FORD'ABLE, a. *-ă-bl*, that may be passed through on foot. FORD'ABLENESS, n. *-bl-nĕs*.

FORD, EDWARD ONSLOW, English sculptor: b. London 1852; d. 1901. He studied in Antwerp and Munich, and was made a Royal Academician of London in 1859. His artistic faculty was displayed in felicitous portraiture, and he executed striking statues of many eminent contemporaries, including Gladstone and 'Chinese' Gordon. A monument to his memory was unveiled in Grove End Road, Saint John's Wood, London, 1903, July 13.

FORD, HENRY JONES, American editor: b. Baltimore, Md., 1851, Aug. 25. He was graduated from the Baltimore City College in 1868, was connected with the *American* and *Sun* of Baltimore and the *Sun* of New York, and in 1901 became editorial manager of the Pittsburg *Commercial Gazette* and *Chronicle-Telegraph*. He published *The Rise and Growth of American Politics* (1898).

FORD, JAMES LAUREN, American journalist: b. St. Louis, Mo., 1854, July 25. He has written several volumes of short stories and essays, among which are: *Hypnotic Tales* (1891); *The Literary Shop* (1894); *Bohemia Invaded; Dolly Dillenback*. He is also the author of two books for young readers: *Dr. Dodd's School* (1892); and *The Third Alarm* (1893).

FORD, JOHN: English dramatist: date of birth not known, but he was baptized in Ilsington Church, 1586, April 17; second son of Thomas Ford of Ilsington, co. Devon; date of death unknown. His family was connected with the famous Lord Chief Justice Popham and he became a member of the Middle Temple 1602; unlike many of the poetic tribe, Ford seems to have adhered to his studies, and to have attained some professional success. His first poem was an elegy on the death of the Earl of Devonshire, *Fame's Memorial*. In 1629, he produced *The Lover's Melancholy;* and four years later, *The Broken Heart* and *Love's Sacrifice*. Next year came *Perkin Warbeck;* and 1638–9, *The Fancies Chaste and Noble* and *The Lady's Trial*. After this, Ford drops out of literary history. Some think that he died soon afterward; others, that he retired to his native place, married, and lived to an old age. Ford takes high position as a dramatist, more by general mental force than through dramatic instinct or poetic genius. In his compositions, there is a sense of effort: his versification—even when the subject-matter is distinctly noble—is hard and

prosaic. He has no humor. He has been praised for his pathos, but in his pathetic scenes effort is apparent. He cannot 'flatter' you to tears, as Shakespeare and the greater poets do. An edition of his works, published by Moxon (Lond. 1840), is enriched by biographical and critical notices by Hartley Coleridge; another by the Rev. Alex. Dyce, appeared 1869.

FORD, John Donaldson, American engineer; b. Maryland. He entered the United States navy as third assistant engineer in 1862 and during the Civil War took part in several important engagements. Later, after having served on many expeditions, he was detached and ordered to Baltimore for the purpose of organizing the Baltimore Manual Training School. In 1890 he was made a chief engineer in the navy; was assigned to duty on the Brooklyn in 1896; and in 1898 joined the Asiatic fleet and took part in the destruction of the Spanish fleet and batteries at Cavite. In 1902 he was promoted rear-admiral, and placed on the retired list, but continued on duty as inspector of machinery and ordnance at Baltimore and Sparrow's Point.

FORD, John Thomson, American theatrical manager: b. Baltimore, Md., 1829; d. 1894. He was manager of the Holliday Street Theatre, in Baltimore, of which city he was acting mayor for two years. Among the three theatres he built at Washington, D. C., was the well-known Ford's Theatre, the scene of the assassination of President Lincoln. He was arrested as an accomplice of Booth, but as there was absolutely no ground for the accusation he was discharged. In 1871 he built Ford's Grand Opera House at Baltimore.

FORD, Paul Leicester: an American author, 1865–1902, May 8, b. in Brooklyn, N. Y. His death by the hand of a brother, who also took his own life, was a most pathetic tragedy. His works include *The Honorable Peter Stirling, The True George Washington, Bibliotheca Hamiltonia, Franklin Bibliography, Janice Meredith,* and an edition of the works of Thomas Jefferson, with biographical introduction, notes, etc. Other works were *Short Stories, The Story of an Untold Love, Tattle Tales of Cupid,* etc.

FORD, Sallie Rochester: American story-writer, b. Rochester Springs, Boyle County, Ky., 1826; d. 1902. She was married to S. H. Ford in 1855, and with him edited the *Christian Repository* and the *Home Circle* for many years. Among her published works are *Grace Truman* (1857); *Mary Bunyan* (1859); *Morgan and His Men* (1864); and *Ernest Quest* (1887); *The Inebriates,* etc.

FORD, Walter: an American song-writer, about 1860–1901, March 6. In connection with John W. Bratton he published about 100 songs, of which he wrote the words. These include *Darling Sue, Isabel, Sunshine of Paradise Alley, I Love You in the Same Old Way,* and *At the Sound of the Sunset Gun.*

FORD, Washington Chauncey, American statistician: b. Brooklyn, N. Y., 1858, Feb. 16. He is a brother of P. L. Ford (q.v.). He was chief of the bureau of statistics, Department of State, 1885–9, and of the bureau of statistics in the Treasury Department in 1893–8; was connected with the Boston Public Library 1897–1902; and chief of the division of manuscripts, Library of Congress since 1902. He was chosen lecturer on statistics in the University of Chicago in 1901. He published; *American Citizen's Manual; The Standard Silver Dollar* (1884); *George Washington* (1899).

FORDHAM, *fōrd'am:* formerly post village of Westchester co., N. Y., 10 m. from Grand Central Depot; since 1874 part of the co. and city of New York; on the New York and Harlem railroad. It contains 4 churches, a number of noted Rom. Cath. institutions, including St. John's College, which has a library of nearly 67,000 vols., a theol. school, ladies' acad., and female deaf-mute asylum. In Fordham was Jerome Park, the fine race course of the American Jockey Club, now the site of a new reservoir.

FORDO, v. *fŏr-dō'* [*for*, against, and *do*]: in *OE.*, to ruin; to destroy; to weary. Fordid', pt. ruined. Fordone, pp. *-dŭn*, overcome; wearied with labor.

FORDUN, *for-dŭn'*, John of: early Scottish chronicler, a secular priest, who wrote about 1380. Nothing more is known about him, though it has been inferred from his name that he was born at Fordun in Kincardineshire, and it has been said that he was a canon of the cathedral church of Aberdeen. Having proposed to himself the compilation of a chronicle of Scotland, he is said to have travelled on foot through Britain and Ireland in search of materials. He lived to write only five books of his *Scotichronicon*, bringing the history down to the death of King David I. 1153. He left collections extending to 1385, about which time he is supposed to have died. The work which John of Fordun left unfinished was resumed 1441 by Walter Bower, abbot of the monastery at Inch Colm, in the Firth of Forth. He enlarged Fordun's five books, and making use of his collections as far as they went, wrote 11 new books, bringing the *Scotichronicon* down to 1437; but he also made many arbitrary alterations from Fordun's narrative. The work is the chief authority for the history of Scotland prior to the 15th c.; its value being greatest during the 14th c. when it is contemporary. It exists in more than 20 mss., the principal of which is in the Wolfenbüttel library. Four printed editions have been published; the best is edited by W. F. Skene (2 vols. Edinburgh 1871–2), from the text of the Wolfenbüttel and other standard mss.: Bower's interpolations and additions are separated from Fordun's text.

FORE, a. *fōr* [Ger. *vor*, before—another form of For, which see]: in front of; coming or going first; preceding. Former, a. *fŏr'mėr*, before another in time or order.

FOREMOST, a. *fōr′mōst*, first in place or rank. FORE AND AFT, among *seamen*, the whole length of the ship from end to end—*fore* meaning front or first part, and *aft* behind or hinder part; in the direction of a ship's length from stem to stern. As a prefix, *fore* generally means priority in time; before; front part.

FORE, prep. *fōr* [see FORE 1 and FOR 1]: in *Scot.*, signifying priority. TO THE FORE, in the front; in *Scot.*, still living; above ground; not expended (see FORE, above).

FORE, in Nautical Matters: the front or foremost part of a ship. The *forehold* is that part of the hold between the cutwater and the foremast. The *forecastle* [see below] is that portion of the upper deck extending from the foremast to the bow; it is the part to which the common sailors have free access, and probably derives its name from a small turret or castle placed near the prow in ancient vessels, from which darts and other projectiles could be most conveniently hurled upon an enemy: the term includes also the part under the main deck forward where the sailors sleep and eat. *Foremast* is the first or front mast; surmounted by the foretop-mast, foretopgallant-mast, and foreroyal; its sails being foresail, foretopsail, etc.; between it and the bow flies the forestaysail hoisted on the forestay, a massive rope passing from the foretop to the bow, and, with the backstays and shrouds, maintaining the mast perpendicular. *Forebraces* are ropes passing from the extremities of the foreyard into the maintop, whence they descend through pulleys to the deck where they serve, when necessary, to alter the direction presented by the foresail to the wind.

FOREADVISE, v. *fōr′ăd-vīz′* [*fore*, and *advise*]: in *OE.*, to warn before the action or event happens.

FOREARM, n. *fōr′ârm* [*fore*, and AS. *earm*, the shoulder-joint]: the part of the arm between the elbow and the wrist.

FOREARM, v. *fōr-ârm′* [*fore*, and L. *arma*, weapons]: to prepare for attack or resistance before the time of need. FOREARM′ING, imp. FOREARMED′, pp. *-ârmd′*.

FOREBEARS, or FORBEARS, n. plu. *fŏr-bārz′* [AS. *for*, before: Goth. *bairan*, to produce children: Icel. *furdr*, bearing children]: in *Scot.*, forefathers, ancestors.

FOREBODE, v. *fōr-bōd* [*fore*, and *bode:* Icel. *fyrir-boda*]: to foretell; to feel a secret sense of something future —usually applied to evil. FOREBO′DING, imp.: ADJ. presaging; ominous: N. perception beforehand. FOREBO′DED, pp.—SYN. of 'forebode': to augur; presage; betoken; prognosticate; portend; predict.

FOREBY, prep. *fōr-bī′* [*for*, and *by*]: in *OE.*, near by; fast by. FORBYE′, in *Scot.*, over and above; besides.

FORECAST, v. *fōr-kăst′* [*fore* and, *cast*]: to foresee; to plan before execution. FORECAST′ING, imp. FORECAST′-

ED, pp. FORECAST, n. *fōr'kăst*, previous contrivance; foresight. FORECAST'ER, n. one who.

FORECASTLE, n. *fōr'kăs-l* or *fōk'sl* [*fore*, and *castle*]: forepart of a ship, formerly much raised and in the form of a castle; the part of the upper deck forward from the foremast; the forward part under the main deck in merchant ships where the sailors live.

FORECLOSE, or FORCLOSE, v. *fōr-klōz'* [*for*, against, and *close:* F. *fors*, without; *clos*, closed, shut up: F. *forelore*, to foreclose]: to close or shut against; to put an end to; to preclude. FORECLO'SING. imp. *-zĭng*. FORECLOSED', pp. *-klōzd'*, precluded; cut off from the right of redemption—usually said of a mortgage. FORECLO'SURE, n. *-klō'zhûr*, act of foreclosing; prevention; in *law*, proceeding by which a mortgagee gains possession of the property of a mortgagor unable to pay either principal or interest of a loan made on the security of the property. The mortgagor has an equity of redemption in his property as long as he can pay the interest, but when he is no longer able the mortgagee may file a bill calling on the mortgagor, in a court of equity, to redeem his estate within a specified period, or, in default thereof, to be forever closed or barred from any right of redemption. In N. Y., Ind., Ky., Md., S. C., Tenn., and Va., the practice is for the mortgagee to obtain a decree for a sale of the land under the direction of an officer of the court, in which case the proceeds are applied to the discharge of the incumbrances according to their priority. Should the sale yield more than the aggregate of principal and unpaid interest, the surplus is turned over to the mortgagor. In some states a mortgage is foreclosed without a sale, and in such case an extension of time is granted the mortgagor, and under some state laws the proceedings in foreclosure extend over an entire year, particularly if the mortgagor charges fraud or resists, see MORTGAGE. *Note.—Fore* in 'forego' and 'foreclose' does not mean 'before,' but 'against, across,' and is therefore an erroneous spelling of for.

FOREDOOM, v. *fōr-dôm'* [*fore*, and *doom*]: to doom beforehand.

FORE-DOOR, n. *-dōr*, the door in front of a house.

FOREFATHER, n. *fōr'fâ-thėr* [*fore*, and *father*]: an ancestor.—SYN. of 'forefathers': ancestors; progenitors; predecessors; forebears.

FOREFEND, v. *fōr-fĕnd'* [*fore*, and *fend*]: to ward off; to keep off; to hinder; to prevent approach; to prohibit. FOREFEND'ING, imp. FOREFEND'ED, pp.: see FORFEND.

FOREFINGER, n. *fōr'fĭng-gėr* [*fore*, and *finger:* perhaps *OE. forme*, first, and *finger*]: the finger next the thumb.

FOREFOOT, n. *fōr'fût* [*fore*, and *foot*]: one of the front feet of an animal.

FOREFRONT, n. *fōr'frŭnt* [*fore*, and *front*]: the front part.

FOREGO, v. *fōr-gō′* [*fore*, before, and *go*]: to go without; to give up; to forbear to possess or enjoy. FOREGO′ING, imp. giving up: ADJ. preceding; going before. FOREGONE, pp. *fōr-gŏn′*, given up: ADJ. made up or decided beforehand. FOREWENT, pt. *fōr-wĕnt′*, went before; preceded; gave up. *Note.*—Some English authorities make a distinction between *forego* and *forgo: forego*, to go before; *forgo*, to go against or without. But English usage is not uniform in observing this distinction; and in the United States, both meanings are combined under *forego*, and the form *forgo* is not in use.—SYN. of 'forego': to quit; relinquish; leave; resign; renounce; abandon; abjure;—of 'foregoing': antecedent; previous; former; anterior; prior.

FOREGROUND, n. *fōr′grownd* [*fore*, and *ground*]: that part of a picture which appears to lie nearest the eye of the observer.

FOREHAND, a. *fŏr′hănd* [*froe*, and *hand*]: done sooner than is regular; in *Scotch law*, rent of a farm made payable before the crop, of which it is the rent, has been reaped: N. the part of a horse before the rider; in *OE.*, preference; advantage. FORE′HANDED, a. *-hănd-ĕd*, early; timely.

FOREHEAD, n. *fŏr′ĕd* [*fore*, and *head*]: the part of the face extending from the hair of the head to the eyes; the brow.

FOREHEND, v. *fōr-hĕnd′* [*fore*, and OE. *hend*, to seize, which see]: in *OE.*, to be seized; to be laid hold of. FOREHENT′, pp. *-hĕnt′*, seized; laid hold of.

FOREIGN, a. *fŏr′ĭn* [F. *forain;* It. *forense*, belonging to what is without—from mid. L. *forānĕŭs*, that which is without, strange—from *foris*, out of doors—*lit.*, that is without]: external; alien; belonging to another nation or country; not to the purpose; remote; not native or natural. FOR′EIGNER, n. *-ẽr*, one belonging to another country; not a native (see ALIEN). FOR′EIGNNESS, n. *-nĕs*, remoteness. FOREIGN-PLEA, in *law*, plea objecting to a judge on the ground that he has not cognizance of the subject-matter of the suit.—SYN. of 'foreign': extraneous; outside; without; remote; extrinsic; outlandish; exotic; strange; excluded.

FOR′EIGN ATTACH′MENT: legal attachment or arrestment of a citizen of one country in another country. It may have reference either to person or to property. In several states the laws provide for such process and for levy on the property of absconding or non-resident debtors; but the laws of different states vary in details.—The several states of the American Union are not counted *foreign* to each other: the Constitution (q.v.) provides that each shall give full faith and credit to the public acts, records, and judicial proceedings of every other state. The congress is to provide the legal methods for proving and giving efficiency to the judicial decisions of each state in every other; and this is accomplished universally except in regard to DIVORCE—in which particular the laws thus far are grievously deficient. See ATTACHMENT: ARREST: ARRESTMENT:

APPREHEND: FOREIGN COURTS: FOREIGN JUDGMENT: FOREIGN LAWS: GARNISHMENT. A defendant arrested or attached in a foreign country may be again arrested in his own country on the same ground of action.

FOR'EIGN AUXIL'IARIES, in the British and other armies. In early English history, foreign auxiliaries were common. Harold had a body of Danes in his army when he defeated the Norwegian king; and to their refusal to march against the kindred Normans he owed one of the chief complications which ultimately overwhelmed him. In modern times, William III. had for some time a body of Dutch troops in his pay as king of England: throughout the 18th c. Hessian and Hanoverian regiments were constantly in the pay of the English govt. for temporary purposes. Hessians fought for England in the American Revolution; and the Landgrave of Hesse, who sold his troops at so much a head, received more than £500,000 for soldiers lost in that struggle. During the Irish rebellion 1798, many Hessian troops were employed. In 1794 during the continental war the 'King's German Legion,' of 15,000 men, were embodied in the British army, and were later increased to nearly 30,000. They distinguished themselves in various engagements. Corps of French *émigrés* also, as the York Rangers and others, were organized. All were disbanded 1815.

During the Russian war, in 1854, the British govt. again had recourse to the enlistment of foreigners, under special provision that the legionaries were in no case to be used against British subjects, in the event of internal discord. The numbers to be raised were 10,000 Germans, 5,000 Swiss and 5,000 Italians; the pay to be the same as to British troops, but with no future claim to half-pay. About half the number of men were enrolled, and were said to have reached great efficiency, when the stoppage of hostilities caused them to be disbanded at a great cost for gratuities, etc.

The Swiss auxiliaries (Swiss Guards) used to form a regular contingent in many of the armies of Europe, especially of France and Italy. Over 1,000,000 served in France from the time of Louis XI, to that of Louis XIV. (1465–1715): see GARDES SUISSES. The Swiss usually served only on condition of being commanded by their own officers, and occasionally these officers obtained distinction and fame. But the privates returned home poor and often demoralized; and the cantons which supplied most mercenaries suffered severely by their absence. After the French Revolution, the cantons ceased publicly to hire out their subjects; and after 1830 most of the cantons forbade foreign enlistment. In 1859 the Confederacy passed a severe law against recruitment for service abroad. There is still, however, a large contingent of Swiss mercenaries in the Dutch E. Indian Colonies. The Papal Swiss troops have shrunk to a body-guard of about 100 men.

FOR'EIGN BILL OF EXCHANGE': bill either both

drawn and accepted in a foreign country, or drawn by a person residing in a foreign country, on a person in this country; or the reverse.

It is the usual rule, that the liabilities of the drawer, the accepter, and indorser, shall be governed by the laws of the countries in which the drawing, acceptance, and indorsement respectively took place (Phillimore's *International Law*, iv. 606, 506). In the case of bills both drawn and accepted in a foreign country, and which are thus in reality foreign contracts, but of which the accepter is a native of this country, and which he seeks to enforce in the courts of his own country, a distinction is made between the contract and the remedy. See EXCHANGE.

FOREIGN COINS. See MONEY.

FOR'EIGN COURTS: tribunals of law in foreign countries. Chancellor Kent, after stating that in cases not governed by the constitution and laws of the United States, the doctrine of the English law, as to the force and effect to be given to foreign judgments, is the law of this country also, observes, that the law thus common to England and America 'is exceedingly, if not peculiarly liberal, in the respect which it pays to foreign judgments, in all other cases except the case of a foreign divorce or an English marriage. A distinction was early taken by Lord Nottingham, and is now recognized both in England and America, and indeed almost everywhere else, between a suit brought to enforce a foreign judgment, and a plea of a foreign judgment in bar of a fresh suit for the same cause. As the effect to be given to a foreign judgment is altogether a matter of comity, in cases where it has not been regulated by positive treaty, and no sovereign is bound to execute within his own dominion a sentence given out of it, the rule adopted, where a suit is brought to enforce a foreign judgment, is that the foreign judgment is to be received, in the first instance, as *primâ facie* evidence of the debt, but that the defendant is entitled to impeach the justice of it or to show that it was irregularly and unduly obtained. But the case is different where the losing party comes forward and wishes to institute a new suit upon the same matter, and to open up a foreign judgment dismissing the action, pronounced by a competent court. In this case, to interfere with the foreign judgment would be to assume the attitude of a court of review; and the rule . . . . consequently is that such a decision, when given by a foreign court, is final and conclusive. So obvious, indeed, is the convenience and necessity of this rule, that it has been regarded as forming a portion of general jurisprudence.' —Kent's *Com.* II. 101, 102. As regards the enforcement of foreign decrees and judgments, the usages of nations have differed considerably, and the subject is wide and difficult. For the distinction between the recognition of the judgment of a foreign court, as determining the validity of a foreign contract, and the application of a foreign remedy by the courts of a country. See FOREIGN BILL OF EXCHANGE.

The French courts are in the habit of giving effect to judgments obtained in England, and debtors cannot escape from their creditors, as is generally supposed, by simply crossing the Channel. The difficulty still exists where the debtor has escaped before any proceedings could be taken against him in England, and where no judgment can be obtained. The same observations apply to Belgium. (Phillimore, *International Law*, iv. See JURISDICTION; DOMICILE; INTERNATIONAL LAW, PRIVATE; CONFLICT OF LAWS; EDICTAL CITATION; etc.

FOREIGN EXCHANGE. See EXCHANGE.

FOR'EIGN OFFICE, of Great Britain: department of administration, established 1782, in charge of British interests in other countries. Its head is the secretary for Foreign Affairs, who selects diplomatic officials, negotiates treaties, grants passports, etc.

FOR'EIGN TRADE. See IMPORTS AND EXPORTS; FREE TRADE; TARIFF; BALANCE OF TRADE.

FOREJUDGE, v. *fōr-jŭj'* [*fore*, and *judge*]: to judge before hearing the facts and proofs.

FOREKNOW, v. *fōr-nō'* [*fore*, and *know*]: to know before; to have a previous knowledge of. FOREKNOWLEDGE, n. *fōr-nŏl'ĕj*, knowledge of a thing before it happens; prescience; in *theology*, see ARMINIUS: CALVINISM: ELECTION: PREDESTINATION. FOREKNOWN, pp. *fōr-nōn'*, known beforehand.

FORELAND, n. *fōr'lănd* [*fore*, and *land*], a cape; a promontory. NORTH FORELAND and SOUTH FORELAND, two promontories on the e. coast of Kent, England; between which are the Downs and Goodwin Sands. North Foreland, the *Cantium* of Ptolemy, forms the n.e. angle of the county and of Thanet Isle, lat. 51° 22′ n., and long. 1° 26′ e., two m. e. of Margate. It consists of chalky cliffs, nearly 200 ft. high, projecting into the North Sea, and has a lighthouse with a fixed light, 184 ft. high, visible 24 m. off. South Foreland, also of chalk-cliffs, is 16 m. s. of North Foreland, 3 m. n.e. of Dover, lat. 51° 8′ n., and 1° 22′ e. It has two fixed lights, respectively 380 and 275 ft. above the sea, visible 25 and 22 m.

FORELAY, v. *fōr-lā'* [*for*, against, and *lay*]: in *OE.*, to lay wait for; to entrap by an ambush; to lay down beforehand. FORELAY'ING, imp. N. in *S. Africa*, forming or laying an ambush in front of. FORELAID', pt. pp. *-lād'*.

FORELEND, v. *fōr-lĕnd'* [*fore*, and *lend*]: in *OE.*, to give beforehand. FORELENT, pt. pp. *-lĕnt'*, given beforehand.

FORELIFT, v. *fōr-lĭft'* [*fore*, and *lift*]: in *OE.*, to raise aloft an anterior part. FORELIFT'ING, imp. raising up an anterior part.

FORELOCK, n. *fōr'lŏk* [*fore*, and *lock*]: the hair that grows over the forehead. TO TAKE TIME BY THE FORELOCK, not to let slip an opportunity; to make the most of time.

FORELOCK, *fōr′lŏk:* flat wedge driven through the end of a bolt to prevent its withdrawal; used principally on board ship.

FOREMAN, n. *fōr′măn* [*fore,* and *man*]: a man set over workmen; the chief man of a jury. FORE′MAST, n. *-măst,* in a *ship,* the mast nearest the forepart.

FOREMEN′TIONED, a. *-mĕn′shŭnd,* said or written before.

FOREMOST, a. *fōr′mōst* [AS. *forma,* first, the superl. of *fore; foremost* being thus really a double superlative]: first in place or rank.

FORE′NAMED, a. *-nāmd,* mentioned before.

FORENOON, n. *fōr′nôn* [*fore,* and *noon*]: from the morning to mid-day.

FORENSIC, a. *fō-rĕn′sĭk* [L. *foren′sis,* belonging to the market or forum—from *forum,* the forum or market-place, where causes were tried and pleaded. It. *forense*]: pertaining to courts of judicature, or to discussions or pleadings in them; used in courts or legal proceedings, as a *forensic* term, a *forensic* speech.

FOREORDAIN, v. *fōr′ŏr-dān′* [*fore,* and *ordain*]: to ordain or appoint beforehand, as by God; to predestinate. FORE′ORDAIN′ING, imp. appointing beforehand. FORE′-ORDAINED′, pp. *-dānd′,* appointed beforehand. FOREOR′-DINA′TION, n. *ŏr′dĭ-nā′shŭn,* previous ordination or appointment by God; predestination: see ARMINIUS: CALVINISM: ELECTION, in Theology: PREDESTINATION.

FOREPART, n. *fōr′pârt* [*fore,* and *part*]: front or first part.

FOREPAST, a. *fōr′păst* [*fore,* and *past*]: in *OE.,* bygone; previous.

FORERANK, n. *fŏr′răngk* [*fore,* and *rank*]: in *OE.,* first rank; front.

FOREREACH, v. *fōr-rēch′* [*fore,* and *reach*]: in *nav.,* to get before another ship by better sailing.

FORE-RECITED, a. *fōr-rē-sī′tĕd* [*fore,* and *recited*]: mentioned or enumerated before.

FORERUN, v. *fōr-rŭn′* [*fore,* and *run*]: to precede; to come before. FORERUN′NING, imp. FORERAN′, pt. *-răn′.* FORE′RUNNER, n. *-rŭn-nėr,* a messenger sent before; a harbinger; an ancestor; a prognostic.

FORESAY, v. *fōr-sā′* [*fore,* and *say*]: to predict; to foretell. FORESAID, a. *fōr′sĕd* [*fore,* and *said*]: spoken of before; described before.

FORESEE, v. *fōr-sē′* [*fore,* and *see:* Dut. *vorzien;* Sw. *förese,* to *foresee*]: to see or know an event before it happens. FORESEE′ING, imp. FORESAW′, pt. *-saw′.* FORE-SEEN,′ pp.

FORESHADOW, v. *fōr-shăd′ō* [*fore,* and *shadow*]: to shadow or typify beforehand; to portend. FORESHAD′-

OWING, imp.: N. act of shadowing beforehand; anticipation. FORESHAD'OWED, pp. *-ōd.*

FORESHIP, n. *fōr'shĭp:* the forepart of a ship.

FORESHORE, n. *fōr'shōr* [*fore,* and *shore*]: the front shore; the part of the beach or shore stretching between low and high water marks; also applied to parts but recently covered within those limits by water.

FORESHORTEN, v. *fōr-shŏrt'n* [*fore,* and *shorten*]: to represent figures as they appear when viewed obliquely. FORESHORT'ENING, n. *-shŏrt'nĭng,* in *painting,* the art of diminishing the entire length of an object when viewed obliquely. FORESHORT'ENED, pp. *-shŏrt'nd.—Foreshortening* is a term in painting or drawing, signifying that a figure, or a portion of a figure, or a construction, intended to be viewed by the spectator direct or nearly in front, is so represented as to convey the notion of its being projected forward; and, though by mere comparative measurement occupying a much smaller space on the surface, yet to give the same idea of length or size as if it had been projected laterally. In compositions of figures and groups on ceilings, and in the interior of domes, etc., numerous examples will be found in which this art has been put in practice; in the works of Raphael, foreshortening is practiced with most judgment and correctness; those of M. Angelo, Correggio, and Tintoretto show greatest boldness; but the three last-named artists have been censured for introducing foreshortening too frequently into their compositions, for the purpose of parading their skill in practicing it.

FORESHOW, v. *fōr-shō'* [*fore,* and *show*]: to represent or reveal before it happens; to predict; to foretell.

FORESIDE, n. *fōr'sīd* [*fore,* and *side*]: in *OE.,* outside; superficial appearance.

FORESIGHT, n. *fōr'sīt* [*fore,* and *sight*]: foreknowledge; prescience; provident care of futurity.—SYN.: forseeing; prognostication; providence; prudence; forethought; forecast; premeditation.

FORESIGNIFY, v. *fōr-sĭg'nĭ-fī* [*fore,* and *signify*]: to indicate the nature of beforehand; to typify.

FORESKIN, n. *fōr'skĭn* [*fore,* and *skin*]: the skin that covers the glans penis.

FORESKIRT, n. *fōr'skĭrt* [*fore,* and *skirt*]: in *OE.,* the loose part of the skirt of a coat hanging in front.

FORESPENT, and FORSPENT, a. *fōr-spĕnt'* [*for,* intensive, and *spent*]: in *OE.,* spent completely; exhausted; wearied; wasted; forepast; past.

FOREST, n. *fŏr'ĕst* [It. *foresta;* OF. *forest;* F. *forêt,* an uncultivated tract of country—from mid. L. *fores'ta,* an open tract of ground reserved for the chase—from L. *fŏrĭs,* out of, not shut: W. *gorest,* waste ground: Gael. *fridh,* an uncultivated open space]: a large tract of land covered

with trees; an uncultivated tract of ground interspersed with wood for field-sporting: ADJ. sylvan; rustic. FOR'ESTED, a. covered with trees; wooded. FOR'ESTER, n. one appointed to watch a forest and protect game. FORESTRY, n. *fŏr'ĕs-trĭ*, the art of forming forests. FOREST-TREE, not a fruit tree. FOREST-MARBLE, in *geol.*, a shelly limestone of the oolitic formation.

FORESTALL, v. *fōr-stawl'* [*fore*, and *stall:* AS. *forestealllan*, to forestall]: to buy goods before they are brought to stall or the market where they are to be sold; to anticipate; to take beforehand. FORESTAL'LING, imp. anticipating; hindering (see ENGROSSING). FORESTALLED', pp. *-stawld'*. FORESTAL'LER, n. one who.—SYN. of 'forestall': to monopolize; engross; preoccupy; deprive; obstruct; intercept.

FORESTAY, n. *fōr'stā* [*fore*, and *stay*]: a strong rope in a ship reaching from the foremast-head, and assisting to support the foremast.

FORESTERS, ANCIENT ORDER OF, a fraternal order founded 1745, at Yorkshire, England, with a membership 1903 of over 1,000,000, divided among 9,000 courts. The order was introduced into the United States in 1832, and despite the fact that over 175,000 members withdrew and organized the Foresters of America in 1895, the order in this country has a membership of 38,898.

FORESTERS OF AMERICA, a fraternal, benevolent order known under this title since September 1895. Originally the order was part of the Ancient Order of Foresters (1745), but freed itself from the High Court of England (1889), and became a separate order. There were 1,873 courts in 1906, with a membership of 241,110.

FORESTERS, THE INDEPENDENT ORDER OF, was organized in 1874 in New Jersey. It was reorganized in Canada by the Hon. Dr. Oronhyatekha, a full-blooded Mohawk Indian of scholarly distinction, high character, and great ability, who was educated under the patronage of the present king of England, in 1881. In 1881 the society consisted of 369 members. It now numbers 250,000. The membership extends throughout all of the provinces of Canada, nearly all of the States of the American Union, England, Ireland, Scotland, Wales, Norway, Denmark, France, Belgium, India, Newfoundland, and Australia. The order is governed by a supreme body, which meets once in three years. The local jurisdictions are governed by high courts of the various States and Provinces. The funds, however, are all forwarded to the head office, there being invested under the insurance law of Canada, which prevents investment in anything except first-class gilt-edge securities. The head office of the order is in Toronto, Canada, the building being a magnificent structure known as the Temple Building, which was built and is owned by the order. All premiums cease at 70 years of age, or at any time when the members become totally and permanently disabled, at which time they are allowed to take

in cash one half of the amount of their policy, the balance to be paid to their heirs at death. After 70 years of age members are permitted to draw one tenth of their policy for each of 10 years if they live so long, the balance to go to their beneficiaries at death. The order also has a sick and funeral benefit division. It admits lady members, these being called companions, who are gathered in separate courts.

FOR'EST FLY (*Hippobosca equina*): insect of the order *Diptera;* named from its frequent occurrence in forests, and particularly in the New Forest, Hampshire, England. It is sometimes called HORSE FLY, from the annoyance which it gives to horses. It is a small insect, about four lines long; its wings, two in number, much exceeding the length of the abdomen. When at rest, the wings are laid flat on the back, one overlapping the other. The general color is brown, the thorax varied with pale yellow, the legs ringed with yellow and brown. The legs terminate in hooked claws. The skin is leathery and remarkably tough so that the insect cannot be killed by any ordinary amount of squeezing. The structure of the mouth differs much from that of ordinary dipterous insects, and bears considerable resemblance to that of fleas. The forest fly lives by sucking the blood of quadrupeds, sometimes of oxen, dogs, etc., but most of all of horses. High-bred horses with smooth hair are most liable to this annoyance. The female forest fly does not deposit her eggs until they have reached the pupa stage in her abdomen. Only one is produced at a time, inclosed in a tough, strong skin, egg-like, black, and shining like a bead, wonderfully large when the size of the abdomen from which it came is considered; the perfect insect finally emerges by bursting open a kind of lid or cap.

FOR'EST LAWS, in England: laws for regulation of the royal forests. Forest is defined by Lord Coke to be a safe preserve for wild animals (*ferœ*) of the chase, whence the term *foresta,* by the change of *e* into *o* (*Co. Litt.* 233 a). Both words probably spring from the same root as the Latin *foris* and the French *hors,* and signify that which is *without* the range of the peopled or cultivated country. Hence the Italian *forestiere* and *foresto,* and the Spanish *forestero,* signify strange, foreign, wild, and the like. A forest, in the sense of the law of England, is a large tract of open ground, not necessarily covered with wood, but usually containing woodland interspersed with pasture, and forming part of the property of the monarch, and governed by a special code, called the forest law. This particular law had reference not only to matters connected with hunting and the like, but generally governed the persons living within the forest in all their relations. A *chase* is a smaller forest, in the hand of a subject, but not governed by forest law. Though the privilege of forest belongs of right to the sovereign alone, it may be granted by him in favor of a subject, who becomes entitled to exercise the privileges of forest in the district assigned.

This right was exercised by the Saxon kings, who reserved large tracts of country for the royal pastime of hunting. William the Conqueror greatly extended the royal forests by laying desert vast districts in Hampshire and Yorkshire; he also introduced penalties of the severest kind for offences against the game. The penalty for killing a stag or boar was loss of eyes; for William loved the great game as if he had been their father (*Sax. Chronicle*). It was not till the reign of Henry III. that the forest laws were reduced into a regular code. In the reign of that monarch was passed the charter of the forest, 9 Henry III. (A.D. 1224). The right of the sovereign to create a forest is by the common law confined to lands of his own demesne. Henry II. had arbitrarily exercised his power by afforesting the lands of his subjects; but by the 1st and 3d chapters of the charter of the forest, it is provided that all forests so made should be disafforested. When Henry VIII. created Hampton Court Forest, he was obliged to obtain the consent of the freeholders before he could erect a chase or forest over their grounds (Coke, *Inst.* iv. 301). Mr. Hallam remarks: 'It is well known that Charles I. made Richmond Park by means of depriving many proprietors not only of their common rights, but of their freehold lands. It is not clear that they were ever compensated; but I think this probable, as the matter excited no great clamor in the Long Parliament.'—Hallam *Const. Hist.* i. 463, note, 1st ed. By the charter of the forest, the penalties for destroying game are greatly modified. By cap. 10, it is provided that no man shall lose life or limb for slaying deer, but that the punishment shall be restricted to fine or imprisonment for year and day. Cap. 11 contains the following curious privilege: 'Whatsoever archbishop, bishop, earl, or baron, coming to us at our commandment, passing by our forest, it shall be lawful for him to take and kill one or two of our deer by view of our forester if he be present; or else he shall cause one to blow an horn for him, that he seem not to steal our deer; and likewise they shall do returning from us.' Charles I. attempted to fill his empty exchequer by imposing penalties and exacting fines for alleged encroachments on the ancient boundaries of the forests, though the right to the lands thus taken was fortified by possession for several centuries. This was one of the first grievances with which the Long Parliament dealt, and since the passing of the act for the 'certainty of forests' (16 Car. I. c. 16), the laws of the forest have practically ceased. In Coke's time, there were 69 royal forests, all of which, with the exception of the New Forest and Hampton Court Forest, had been created before the period of record. Of these, the principal were—the New Forest, Sherwood, Dean, Windsor, Epping, Dartmoor, Wichwood, in Oxfordshire, Salcey, Whittlebury, and Rockingham, in Northamptonshire, Waltham, in Lincolnshire, and Richmond, in Yorkshire. Several of the royal forests have been disafforested by act of parliament to be made into public recreation grounds.

FOREST LAWS.

The inhabitants of the forest folds were not allowed to cut wood or hunt on their lands unless licensed by the proper royal official nor could they pasture their beasts if they thus deprived the royal beasts of food. The forest officers consisted of a master forester, two justices in eyre, one for each side of the Trent, verderers (chosen by the forest freeholders from among their own number to maintain the law), the freemen foresters in each bailiwick, and other minor officials. There were three forest courts—the woodmote, or court of attachment held every 40 days before the verderers; this court trying minor cases only but not convicting; the swanmote held three times a year by the verderers which tried presentments and convicted but did not sentence; and the court of justice seat—the supreme court of civil and criminal jurisdiction—held every third year by the justices in eyre. Consult *Statutes of the Real*, Record Commission, Vol. I. (1810); Stubbs, *Constitutional History*, I. (Oxford 1891).

FOREST LAWS. Laws regulating the protection and management of the forest are of ancient origin. Wherever game preservations were set aside for rulers and princes in different countries regulations were made for the protection of deer and other game. Out of these regulations for the preservation of game grew crude codes of law for the protection and management of forest land. Hence it may be said that some of the early game wardens were the forerunners of the foresters of to-day.

Following the Napoleonic wars in Europe there was a marked depression in all industries, and to rejuvenate and rebuild the commercial life of different European countries the various rulers granted certain rights in the forest. In some countries, such as Germany, an industry like the glass industry developed very rapidly and wiped out great areas of splendid forest land. Not until these various countries almost faced a timber famine were laws made that adequately protected and perpetuated the forest.

In nearly every case early settlers in this country came with the idea of protecting wood lands. They soon, however, found that the forests which lined our eastern shores were a menace to their growth and even their lives. It was a tremendous struggle to clear the forest from the land and get it under the control of crops. The forest also harbored marauding Indians and one of the first measures of protecting early settlements was to clear all forests for a considerable space around the little settlements. However, before this idea of the forest as an enemy was fully developed a number of interesting rules and laws were passed in this country. In 1685 a Surveyor of Woods and Timber was appointed for Maine. Shipping timber without a license was one of the customs the office had to guard against. On government land grants pines 34 inches in diameter at one foot from

the ground were reserved, and it was the duty of the surveyor to mark these trees and see that they were properly protected to be used in the development of the English navy. The cutting of a marked tree involved the liability of a fine of 100 pounds. In 1700 a fine of five dollars was imposed if 'pitch, pine or tar trees' less than 12 inches in diameter were cut.

In 1682 William Penn in his ordinances for Pennsylvania stipulated that one acre of forest should be reserved for every five acres clear. In 1735, March, the Assembly of Pennsylvania passed an act relative to forest fires. Again, in 1794, April, a similar act was passed, section 1 of which provides a maximum fineof $50 and a minimum fine of $20 for firing woods.

Shortly after the formation of the Federal Government the fear arose that the easily accessible supplies of timber for naval purposes was in danger of becoming exhausted. Acting in accordance with their presentiments certain measures were passed which attempted to perpetuate material, the continuous supplies of which were felt to be a necessity for the success of our navy. As early as 1799, February, an appropriation of $200,000 was made for the purchase of growing or other timber suitable for naval construction. In 1799, December, Grovers Island, off the coast of Georgia, containing 350 acres, was purchased by the President for $75,000. Other purchases were made on various islands upon which live oak and red cedar grew. In 1820, May, the act of 1817, March, was amended so that it authorized the Secretary of the Navy under direction of the President to explore and select a considerable portion of the vacant and unappropriated lands of the United States which produced the live oak and red cedar timber in extent necessary to furnish the Navy with future supplies. This was the first legislative act setting aside public lands for future timber supplies. Almost immediately 19,000 acres were reserved on several islands bordering the Gulf States. In 1827 and again in 1828 the President was authorized to reserve and purchase live oak timber land in the United States. Twenty-two thousand acres were bought in Florida and for two or three years some attempt at cultivation of trees was made on this Reserve. The amount of land reserved under the above act was as follows:—Alabama 246 acres, Florida 208,824 acres, Louisiana 9,170 acres, Mississippi 26,218 acres.

In 1841 the pre-emption act was passed. This allowed settlers to use timber on claims for certain reasonable development purposes. In 1850 the first act was passed making free grant of lands to railroads, permitting the use of timber from other public lands for the construction of these roads. It may be said that this act unlocked the flood gate and opened to the world the vast resources of the great forest west of the Ohio River. In 1855 the control of the naval timber reserves and public lands generally was transferred to the General Land Office, in the Department of the Interior.

FOREST LAWS.

In 1862 the homestead law was passed. This permitted a settler to acquire 160 acres after five years' residence, later it was amended to six months' residence upon payment of $1.25 per acre. In 1873, March, an act to encourage the growth of timber on the western prairies was passed by Congress. This timber culture act provided that a patent should be given at the end of 10 years for the ¼ section of land whereon 40 acres of trees had been planted and kept in healthy growing condition for 10 years. The land must have been naturally devoid of timber. This act was later amended allowing title to be perfected in eight years. As the act was never satisfactory because it was taken advantage of, it was repealed in 1891. In 1876, August, an act providing for the appointment of a Commissioner of Forestry and appropriating $2,000 was passed by the 44th Congress. Dr. Franklin B. Hough of New York was first Commissioner of Forestry. In 1878, June, the mineral act was passed. This allowed the removal of timber on public lands for the development of mining. At the same time the timber and stone act was passed. This provided for the selling of unreserved and unoffered surveyed public lands.

In 1881 the Division of Forestry of the Department of Agriculture was organized with an appropriation of $5,000. Mr. N. H. Eggleston was appointed first chief of the Division of Forestry. In 1891, March 3, the timber culture act was repealed and section 24 of this act vested in the President the power to establish Forest Reserves by proclamation. Investigations for the selection of public reserves began at once, and before the close of the year, the Yellowstone National Forest and the White River National Forest were formed. From this time on there has been a very rapid development in the forest reserve policy of this country, and in 1908, January, there were 163,000,000 acres of national forests with one exception located entirely in the Rocky Mountain Region and west of it. In 1901, March, the Division of Forestry was advanced to the grade of a Bureau, and in 1905 to the grade of Service.

State Laws.—As the result of agitation on the part of far-sighted men, who at first were called sentimentalists, many of the states have been awakened and made to appreciate the great need for proper protection and management of the forests to increase the water conserving power of the water sheds of large streams so that floods might be prevented and a constant supply of water maintained for domestic use and for the proper development of water power and navigation. There are few states in which forests originally existed which have not suffered severely from great floods and whose supplies for domestic use have been greatly lessened if not entirely destroyed and whose rivers are not now roaring torrents in the spring and dry runs in the summer, thus preventing the improvement of water power and the con-

tinuance of navigation. With the destruction of our forests and with the supplies of coal becoming smaller each year, we shall turn as never before to the building of canals and the navigation of our rivers and the use of electricity generated by water power.

Early in the nineties the state of New York, realizing the necessity for protecting the head waters of the Hudson and other streams, began the appropriation of money for carrying on propagandist work in Forestry, and set aside state lands in the Adirondacks as Forest Reserves. In 1898 a college of Forestry was established at Cornell with Dr. B. E. Fernow as Director. Even before New York began forestry agitation a small body of men was working in Pennsylvania and finally brought about the establishment of a Commission of Forestry and in 1898 began the purchase of waste land for Forest Reserves. There is now a well organized commission which has acquired over 800,000 acres of State Reserves and is running an academy for Forest Rangers at Mont Alto in Franklin County, Pennsylvania. It is probable that Pennsylvania has the best system of Forest Laws of any state in the union.

In the early eighties agitation was begun in Michigan and the long continued efforts of a few have finally resulted in laws which provide for a state forester and a large State Reserve in the north central part of the lower peninsula of that state. Very active work is being carried on at the present time, through a Commission, of which the Hon. Charles W. Garfield of Grand Rapids is Chairman.

The work in Minnesota has been led for a number of years by General C. C. Andrews, who is at present State Forest Commissioner. The state was thoroughly awakened after several terrible forest fires had swept over large areas in the state, destroying not only forests but many small villages. At present there is a fairly efficient system of fire protection with deputy fire wardens in nearly every county or township in the state. Many other states have recently begun activity along the line of forestry and have established forestry commissions and state foresters and are carrying on active agitation which will educate the people along the line of this most important subject. The greatest problem before every state in which timber originally existed in greater or less quantities is that of fire. If forest fires can be prevented there will be few locations in which natural regeneration will not be accomplished by the seed of trees already standing on the ground. Artificial restocking by the planting of seedlings is very expensive and will not be practicable except over watersheds which control the water supplies of towns and cities. Many of the laws which control the work in different states may be said to be in an experimental stage and only the experience of practical work will finally bring about satisfactory legislation.

FOR'EST MAR'BLE: a member of the Lower Oolite, so called because of the occurrence of the typical beds in Wichwood Forest, Oxfordshire. The principal bed is a fissile limestone, containing large numbers of dark-colored shells, and capable of fine polish. On this account, it is used to some extent as 'marble.' It is interstratified with blue marls and shales, and fine oolitic sandstones. The whole thickness of the group seldom exceeds 40 feet.

FOR'EST OAK: name sometimes given in commerce to the timber of *Casuarina torulosa*, and other species of *Casuarina* (q.v.), Australian trees. This timber, which is light yellowish brown and prettily marked with short red veins, is exported and used for ornamental work.

FORESTRY. The term Forestry varies much in meaning in various sections of this country. On the prairies and plains of the West it is understood as tree planting; in the lumber States of the Great Lake Region and the South it is synonymous with lumbering; throughout the country where the subject is more thoroughly understood it is known as the business like production and management of a forest crop. The Century dictionary defines Forestry as "the art of forming or of cultivating timber or of the management of growing timber."

The science of Forestry is dependent upon or closely related to many other sciences, as Political Economy, Geology, Zoology, Chemistry and Mathematics. Like medicine or the law, it is both a science and a practice. So far in this country the practice is just beginning and may be said to be in an experimental stage.

Forestry as a business proposition can be carried on profitably over large areas only by the nation, the state or municipalities. It is a long time investment at a low rate of interest and for many centuries will demand more from the small investor than immediate returns will justify. In Europe the various governments have enforced the preservation of forests at the expense of the owners, making them maintain the forest areas which is necessary for the existence of all. Under conditions existent in this country such a procedure will be impossible. Our government and some of the states have offered inducements, such as rebatement of taxes for the planting of forest trees or the preservation of native wood lands. In most instances this means of increasing interest has not been successful. Since 1891 our government has been setting aside vast areas of public lands, amounting in 1907 to 148,000,000 acres, upon which they will practice Forestry for all the people. While there is little field for the extensive practice of forestry by private owners, it will always be a profitable thing for a small owner to plant quick growing species for fence posts, for farm repair material and, under most favorable conditions and with species which rapidly mature for certain grades of lumber.

The presence of forest areas of greater or less extent is absolutely necessary for the prosperity of any country.

FORESTRY.

Nations which have depleted or exhausted their forests have ceased to exist. The destruction of the forests may not have been a cause for the failure of the nation, but the beginning of the destruction was certainly a sign of decrepitude. The influences of the forest upon the land are fairly well known. Besides the products which they furnish they are of exceedingly great value in the prevention of floods and hence the maintenance of even flow of water in streams and rivers. They do not probably cause or increase rainfall. Statistics show that rain fall has varied little in countries where forests have been entirely destroyed, yet they hold the rain after it falls and have a marked influence upon severity of winds and the temperature of the region. The presence of forests upon the prairies of our West resulting from planting of trees by early settlers has had much to do with the increasing possibilities of growing fruit, ornamental trees and shrubs. Much has been written upon the influence of forests and it is hoped that all who run may read.

With prices of lumber and all other products doubling and tripling within the past decade; with many manufacturing industries forced to move or close their doors because of lack of crude wood material; with only enough timber left in this country, according to an estimate by the Forest Service, to supply our present needs for 50 years; it is becoming very evident to thinking men that the only relief for the present situation is the practice of Forestry and that extended rapidly over our public lands, lands owned by states and to the small holdings of private owners. The very disastrous floods of recent years and those which are occurring every year along our water ways have caused damage to an amount which if expended upon forestry a few years ago in this country would have made these floods impossible. If 1–10 of the value of forests which have been destroyed by fires within the past 25 years could have been spent for the protection of our forests from fires, the tremendous loss of timber, human life and homes would have been prevented and to-day the end of our timber supply would be 100 years farther away.

That the attention of the people of this country is being turned to the necessity for the practice of forestry is evidenced by the very rapid growth of the Forest Service, as shown by an increase in appropriation from about $100,000 in 1897 to over $1,000,000, in 1907. It is also shown by the tremendous demand for young men trained in Forestry who can teach other young men, and who can carry on the work of the government Forest Service and the forestry work in various states. Our railroad companies, manufacturing concerns of all kinds, mining companies, irrigation companies are calling for men trained in Forestry and are paying salaries which are received by members of few other professions. There will be yet greater awakenings because the people

are satisfying themselves that there will be few substitutes for timber and that things will not take care of themselves as has been prophesied. By far the greatest question which will confront the American people during the next half century will be Forestry.

Up to 1870 there may be said to have been no forestry in this country. The first settlers who landed on our shores came with the idea that forests should be protected and cared for but when a realization of the vastness of the forests came to the settlers and as the struggle for the subduing of the land became greater coupled with the fact that the forests sheltered the marauding Indian the settlers soon forgot their interest in forestry and almost with feverish impatience began its destruction. Not until our civil war had passed and the settlement of the far west began, bringing with it a more thorough knowledge of our forest resources, did a few far-sighted men in this country awaken to the need of forestry and begin active agitation. The first appropriation by this government for forestry was in 1876 which was for the creation of a Commissioner of Forestry in the Department of Agriculture. The appropriation was for $2,000, and the duties of the commissioner were to gather statistics and furnish information. Ten years later the Division of Forestry was formed with appropriation less than $30,000. In 1898 Mr. Gifford Pinchot, at present Chief of the Forest Service, became Chief of the then Division of Forestry. Appropriations by this time reached almost $30,000. In 1901 the Division of Forestry became a Bureau. Gradually the work of agitation and education on the part of Forest Service has borne results and now the work of active administration of public forest lands has begun.

FOR'ESTS, Fossil: formations frequent in the coal measures. The seams of coal having in general been formed from the vegetation of the locality where they occur, it is to be expected that when the coal is removed, the stools and roots of the trees would be observed in the immediately subjacent bed of shale—the ancient soil. Such a forest was laid bare in an open work at Parkfield Colliery, near Wolverhampton, England, 1844. In the space of about one-fourth of an acre, the stumps of 73 trees were uncovered. The trunks, broken off close to the root, were lying prostrate in every direction, often crossing each other. One of them measured 15, another 30 ft. in length, but they were generally shorter. They had been invariably converted into coal, and flattened to the thickness of 1 or 2 inches. The upright stems show that some of them had a circumference of more than 8 ft. Similar fossil forests have been observed in the coal-fields of Nova Scotia, and have been carefully described by Lyell, Logan and Dawson. The usual height of the trees observed by Lyell was 6 to 8 ft.; but one tree was about 25 ft. high, and 4 ft. in diameter. Brogniart describes the remains of a fossil forest preserved in an upright position, in strata of mica-

ceous sandstone, belonging to the coal measures at St. Etienne, near Lyon, France. Though most abundant in strata of the carboniferous period, fossil forests have been observed in other formations. The Dirt-bed (q.v.) of the Lower Purbeck series is the remains of an ancient forest. Instances are abundant in the pliocene strata also. Sometimes, as on the coast of Devonshire and on the shores of the Firth of Tay, they are exposed on the surface, stretching from high-water mark to far below the furthest limit of low-water; or they are exhibited in section, as in the cliffs of Eastern Norfolk, where, resting on the chalk or crag, there is a stratum in which the stools and roots of the trees stand in their natural position, the trunks having been broken short off, and imbedded with their branches and leaves. This stratum is covered with fresh-water beds and drift. The position of these forests indicates a variation, in recent geological time, of the relative level of land and water. The instances in Devonshire and Fifeshire may imply a simple subsidence of the land; at Norwich, however, a considerable depression must have taken place, to admit of the deposition of the fresh-water beds and the till, and a subsequent elevation, to expose the beds so high above the sea-level.—The remains of ancient forests, belonging to a later period are to be found in beds of peat. There is good evidence that some kinds of peat had their origin in the destruction of forests. Trunks and branches of beech, hazel, fir, etc., are found in them, and their roots may be traced in the underclay. The rapidity with which this peat is formed is very remarkable. At Blair-Drummond, the stratum of peat is eight to ten, and in some places even twenty ft. in thickness. Many of the trees here have been felled with the axe, and that this was done while the Romans were in possession of the country, is proved by the discovery of 'corduroy roads,' leading from one camp to another, and the finding of camp-kettles at the bottom of the peat.

FORESWART, a. *fōr'swawrt*, or FORE'SWAT, a. *-swât* [*for*, intensive; *swart*, of a dark hue, tawny: *swat*, imperf. of *sweat*]: spent by sweating or heat; overwearied.

FORETASTE, n. *fōr'tāst* [*fore*, and *taste*]: a taste beforehand; anticipation. FORETASTE, v. *fōr-tāst'*, to taste before full possession; to have previous enjoyment or experience of something. FORETAST'ING, imp. FORETAST'ED, pp.

FORETELL, v. *fōr-tĕl'* [*fore*, and *tell*]: to tell before an event happens; to predict. FORETEL'LING, imp. FORETOLD, pt. *-tōld'*, did foretell. FORETOLD', pp. told before; predicted.—SYN. of 'foretell': to prophesy; prognosticate; augur; foretoken; foreshow.

FORETHOUGHT, n. *fōr'thawt* [*fore*, and *thought*]: anticipation; foresight; provident care.

FORETOKEN, v. *fōr-tō'kn* [*fore*, and *token*]: to foreshow; to presignify; N. a previous sign or omen. FORE-

TO′KENING, imp. *-tō′kn-ĭng.* FORETO′KENED, pp. *-tō′knd,* foreshown.

FORETOOTH, n. *fōr′tôth* [*fore,* and *tooth*]: a tooth in the forepart of the mouth.

FORETOPMAST, n. *fōr-tŏp′măst* [*foretop,* and *mast*]: the mast erected on the head of the foremast.

FOREVER, ad. *fŏr-ĕv′ėr* [*for,* and *ever*]: always; ceaselessly; endlessly.—SYN.: continually; incessantly; eternally; everlastingly; constantly; invariably; unchangeably; perpetually; unceasingly; interminably.

FOREWARN, v. *fōr-wawrn′* [*fore,* and *warn*]: to admonish beforehand; to give previous notice to; to caution. FOREWARN′ING, imp.: N. a caution or admonition beforehand. FOREWARNED′, pp. *-wawrnd′.*

FOREWOMAN, n. *fōr′wûm-ăn* [*fore,* and *woman*]: the chief woman in a workshop; female manager.

FOR′FANG, or FORE′FANG [Sax. *fore,* before, and *fangen,* to take]: in England formerly, taking of provision from any one in fairs or markets, before the king's purveyors were served with necessaries for his majesty. Forfang is used to signify also the rescuing of stolen or strayed cattle from a thief, or from those having illegal possession of them; or the reward fixed for such rescue (Wharton's *Dic.*).

FORFARSHIRE, *fawr′fėr-shėr,* or ANGUS, *ăn′gŭs:* maritime county in the e. of Scotland, bounded on the e. by the German Ocean, on the n. by Kincardine and Aberdeen shires, on the w. by Perthshire, on the s. by the Firth of Tay. It extends n. to s. 38 m., and e. to w. 27 m., with 45 m. of coast. There are several valleys of considerable extent, the principal of which are Glen Isla, Glen Prosen, Glen Esk, Clova, and Lethnot, all well watered, and mostly productive. The surface of the county is irregular, and it is intersected with hills, the Sidlaw being 1,400 ft. high, and Catlaw, the highest, 2,264 ft. The soil, which is various, ranging from the finest alluvial to the moorish, rests mostly on old red sandstone and trap. Devonian paving-stones, limestone, porphyry, and jasper, occur. The chief rivers are the Tay, North Esk, South Esk, and Isla; and there are some small lochs. Forfarshire is the chief seat of the Scotch linen manufacture. Cattle, corn, salmon, and paving-stone are the principal exports. The climate is that common to the e. coast. The average of the fall of rain is about 25 inches. Angus was the province of a *Mormaer* during the Celtic period of Scottish history. It appears as an earldom in the 12th c. Its first earls were probably the descendants of the old *Mormaers;* it passed subsequently to the Umphravilles, the Stewarts, and the Douglases. The castle of Forfar was the residence occasionally of some of the kings, until the time of Alexander III. The chief antiquities are some Roman camps, the vitrified fort of Finhaven, the remarkable stone forts of the White

Caterthun, near Brechin, and of the Laws, near Dundee; the sculptured stone pillars at Meigle, Aberlemno, St. Vigean's, Glammis, Kirriemuir, Aldbar, Invergowrie, etc.; the fortified island of St. Margaret's Inch in the Loch of Forfar, the round tower and cathedral of Brechin, the ruins of Restennet Priory and Arbroath Abbey; and the old baronial castles of Glammis, Red Castle, Edzell, Melgund, Finhaven, Airlie, Careston, Inverquharity. At Stracathro, it is said Baliol resigned the crown to Edward I. Pop. (1901) 284,082.

FORFEIT, n. *fôr'fĭt* [F. *forfait*, a crime—from *forfaire*, to misdo, to transgress: mid. L. *foris-factus*, one who has misdone himself—from *foris*, without; *factus*, done]: a fine; a penalty; that which is lost or alienated for a crime, fault, or neglect; in *OE.*, one rendered liable to punishment or penalty, especially capital punishment: V. to lose by neglecting or refusing to fulfil the conditions of a contract or bargain; to lose by some fault, crime, or offense: ADJ. forfeited. FOR'FEITING, imp. FOR'FEITED, pp.: ADJ. lost or alienated by an offense or crime, or by a break of condition. FOR'FEITS, n. plu. in *sport*, things deposited, to be redeemed by a merry fine; in *OE.*, table of penalties. FOR'FEITABLE, a. *-ă-bl*, liable to be forfeited. FOR'FEITER, n. one who forfeits a thing. FOR'FEITURE, n. *-ūr*, the losing of some right, privilege, estate, honor, or office, etc., by some offense, crime, or neglect; that which is forfeited.—SYN. of 'forfeiture' fine; mulct; penalty; amercement; forfeit.

FORFEITURE, a legal penalty, by which an owner is absolutely deprived of his property for crime or other unlawful act. This applies to personal as well as real property, and forfeiture may be a decree of civil as well as criminal courts. The penalty is of feudal origin. The lord owed protection to the life and property of the vassal; the latter owed fealty and service to his lord. When the vassal failed to yield these, he lost the shelter of the law, became an outlaw, and incapable of holding property. Loyalty to the feudal relation being the condition on which life and property were secured to him, when he failed in loyalty he had no longer any claim on life or property.

Treason was punished by forfeiture long before the Norman Conquest in 1066. After that period forfeiture became the ordinary penalty for felony, which was styled petty treason; while treason, or disloyalty in regard to the sovereign, was called high treason. Forfeiture was accompanied by what was styled corruption of blood. This was the sentence of legal bastardy passed on the offender so that he could neither inherit nor bequeath property.

Felony in the United States has never been considered ground for forfeiture. The Federal and State laws have modified all precedents in the matter of forfeiture, which they restrict within very narrow limitations. See ATTAINDER.

In England civil forfeiture may be incurred by tortious

alienation, by wrongful disclaimer, by alienation in mortmain (see MORTMAIN), by breach of condition, and by the commission of waste (see WASTE). In Scotland civil forfeiture may arise either from statutory enactment, at common law, or by agreement. In the United States civil forfeiture is only imposed for acts of waste committed by tenants for life or years, or for breach of contract in violating the conditions on which lands were granted. Some States have abolished even this degree of forfeiture. By particular statutes enacted by Congress smuggling, or importing goods on fraudulent invoices involve confiscation, and forfeiture of the entire invoice (see INVOICE), or the balance wrongly imported. Piracy has always entailed confiscation or forfeiture of the piratical craft.

FORFEND, v. *fŏr-fĕnd'* [*for*, and *fend*, the familiar abbreviation of *defend:* F. *defendre*, to forbid (see FOREFEND)]: to hinder; to avert.

FORFEX, n. *fawr'fĕks* [L.]: pair of scissors.

FORFICULA, n. *fawr-fĭk'ū-la* [L. pair of small shears or scissors]: typical genus of *Forficulidæ*, a family of insects, the only known one belonging to the order *Euplexoptera*, or *Dermaptera*.

FORGAT, v. *fŏr-găt':* an old pt. of *forget;* forgot.

FORGAVE: pt. of FORGIVE, which see.

FORGE, v. *fōrj* [F. *forge;* It. *forgia*, a smithy—from L. *fabrĭca*, a workshop—from L. *faber*, a smith]: to shape a piece of metal by heating and hammering; to make or contrive, in a disparaging sense; to make falsely; to falsify; to counterfeit: N. a place where iron or any other metal is heated and beaten into shape; a smithy. FORG'ING, imp. hammering red-hot iron, etc. FORGED, pp. *fōrjd*. FOR'GER, n. *-jėr*, one who falsifies; a fabricator. FOR'GERY, n. *-jėr-ĭ*, the crime of making or altering checks, stamps, bank-notes, or writings, in order to make them pass as genuine; that which is forged. TO FORGE ON, to make its way slowly and laboriously, as a ship. FORGETIVE, a. *fōr'jĕt-ĭv*, in *OE.*, inventive; productive.—SYN. of 'forge, v.': to fabricate; feign; frame; produce; effect.

FORGERY, the fraudulent making or alteration of a writing to the prejudice of another man's rights, or making of any written instrument for the purpose of fraud and deceit; the word *making*, in this last definition, being considered as including every alteration of or addition to a true instrument. The offense of forgery may be complete though there be no publication or uttering of the forged instrument; for the very making with a fraudulent intention, and without lawful authority, of any instrument which, at common law or by statute, is the subject of forgery, is of itself a sufficient completion of the offense before publication. Most of the statutes, however, which relate to forgery make the publication of the forged instrument, with knowledge of the fact, a substantive offense.

FORGET-ME-NOT.

A deed forged in the name of a person who never had existence is forgery at law. A writing is forged when a person drawing up a will for an invalid, inserts legacies therein falsely. It is not material whether a forged instrument be drawn in such manner that if it were in truth that which it counterfeits it would be valid. The punishment of forgery at common law is, as for a misdemeanor, by fine, imprisonment, and such other corporeal punishment as the court in its discretion might award. The penalty varies in different States, in some the statutes having been much enlarged to include acts which were not punishable formerly as forgery. The punishments ordained for the offense by the statute law in England were once, with scarcely an exception, capital.

FORGET, v. *fŏr-gĕt'* [AS. *forgitan: for*, and *get*]: to let go or lose from the memory; to slight; to neglect. FORGET'TING, imp. FORGOT', pt. did forget. FORGOT'TEN, pp. *-gŏt'n*, escaped the memory; neglected. FORGET'TER, n. one who. FORGET-ME-NOT, a keepsake. FORGET'FUL, a. *-fûl*, inattentive; negligent; apt to forget. FORGET'FULLY, ad. *-lĭ*. FORGET'FULNESS, n. aptness to forget; loss of remembrance; neglect; obliviousness.

FORGET-ME-NOT, or SCOR'PION GRASS (*Myosotis*): genus of annual or biennial herbaceous plants of the nat. ord. *Borragineæ*, with 5-cleft calyx and salver-shaped corolla; the flowers small, and generally blue. The genus is diffused over the temperate zone in all quarters of the world, growing often in ditches and damp meadows—as *Myosotis palustris*, with crooked creeping perennial roots—an angular stem of a foot in height, and calyx covered with appressed bristles. *M. sylvatica*, with calyx covered with stiff spreading hairs, grows in bushy places and woods, and often planted in flower-gardens. The dark blue forget-me-not of the Azores (*M. Azorica*) has of late begun to be cultivated in Europe, but requires the greenhouse. The genus is a favorite with most persons, both because of the brilliancy of the flowers, and because it is generally regarded as the emblem of friendship. The English name Scorpion Grass is now seldom heard. The German name *Vergiszmeinnicht* corresponds with the English *Forget-me-not.—M. versicolor*, often a weed in gardens, is remarkable for the change of color in the flowers, which are first yellow, then blue. They are very small.—*M. alpestris*, found on some of the mountains of Scotland, is especially admired for the size and brilliancy of its flowers.—The name forget-me-not is sometimes given erroneously to the Veronicas, also producing blue flowers.

FORG'ING: process of hammering red-hot iron or steel into any required shape: the workshop in which the operation is performed is called a forge. The principal tools of a common smith's forge are the forge-fire or hearth, with its bellows, the anvil, and the various hammers, swages, etc. For large work, an air-furnace, blown by steam-bellows, supplies the place of the simple hearth of the

blacksmith, powerful cranes swing the work to its place on the anvil, and a steam-hammer (see HAMMER) strikes the blows that squeeze the red-hot mass into shape. Besides these, there are portable forges of various sizes and forms, for military and other purposes. They consist usually of an iron frame, to which a bellows, worked by the foot, is attached; and above the bellows is an iron tray, with a hearth, etc., upon which the fire is made; and the anvil is either attached to this frame, or has a separate stand.

For the general method of forging small work, see CUTLERY. For the largest work to which hand-hammers are still applied, such as anchor-forging, two gangs of from six to twelve hammermen are employed; they swing the large hammers with such wonderful precision and regularity, that the instant one hammer is withdrawn, another falls upon the same place. A foreman, with a wand, directs the hammering. The two gangs relieve each other alternately, on account of the great severity of the labor. Shovels, spades, mattocks, and many other tools and implements, are partly forged under the tilt-hammer. See IRON.

In all processes of forging, it is of primary importance to obtain the greatest possible rapidity in the succession of the blows. There is a double reason for this; first, and simply, that the work is cooling, and the more slowly it is forged, the more frequently it must be re-heated; and secondly, that percussion generates actual heat, and if the blows are sufficiently heavy and rapid, the temperature of the work may be fully maintained out of the fire for a considerable time. The hammer used for tilting steel not only maintains the heat of the bar, but raises it from a dull to a bright red heat.

FORGIVE, v. *fŏr-gĭv′* [*for*, and *give:* AS. *forgifan*]: to pardon; to overlook or remit, as an offense or debt. FORGIV′ING, imp.: ADJ. inclined to overlook offenses; merciful. FORGAVE′, pt. *-gāv′*, did forgive. FORGIV′EN, pp. *-gĭv′n*, pardoned; remitted. FORGIVE′NESS, n. *-nĕs*, pardon; remission.

FORIO, *fō′rē-ō:* thriving town of Italy, picturesquely situated on the w. coast of the island of Ischia, which stands at the northern side of the mouth of the Bay of Naples. The central portion of the town consists of very narrow streets, but the suburbs are composed of charming white cottages. It has three highly decorated churches, a good harbor, and some trade with Leghorn, Naples, and Genoa. Pop. 3,000.

FORISFAMILIATE, v. *fŏr′ĭs-fă-mĭl′ĭ-āt* [L. *foris*, out of doors; *famĭlĭă*, a family]: to portion off a son with land in the lifetime of his father; to give up a legal title to any further share of paternal inheritance; to free from paternal authority. FOR′ISFAMIL′IATING, imp. FOR′ISFAMIL′IATED, pp. FOR′ISFAMILA′TION, n. *-shŭn*, the separation of a child from the family of his father. A child is said to be

forisfamiliated, either when he marries, or when he receives from his father a separate stock, the profits of which are enjoyed by himself, though he may still reside with his father, or when he goes to live in another family with the consent of his father. The same result is brought about when a child renounces his *legitim*, i.e., his legal share of the father's free movable property due to him on the death of the latter.

FORK, n. *fŏrk* [AS. *forc;* L. *furca;* W. *fforch;* Icel. *forkr;* F. *fourche*, a fork]: an instrument having two or more prongs; anything like a fork; a point; the space formed at the angle where a road, a river, the bough of a tree, or the like, separates into two continuous lines or branches; in *OE.*, barb of an arrow: V. to raise or work with a fork; to shoot or divide into blades or branches. FORK'ING, imp. FORKED, pp. *fŏrkt:* ADJ. opening or splitting like a fork into two or more parts; zigzag, as lightning. FORKY, a. *fŏrk'ĭ*, opening like the prongs of a fork. FORK'TAIL, a salmon in its fourth year. FORK'EDLY, ad. *-lĭ*. FORK'EDNESS, n. FORK'HEAD, n. in *OE.*, the point of an arrow. To FORK OUT, in *slang*, to hand over or pay down money. FORKS, n. plu. in *OE.*, the gallows.

FORLI, *fŏr-lē':* province of central Italy, in Emilia, bounded by the Adriatic Sea, the provinces of Pesaroed, Urbino, Florence, and Ravenna, and the republic of San Marino; 716 sq. m. It comprises the districts of Cesena, Forli, and Rimini, has a low and unhealthful but productive coast-region, is traversed by portions of the Apennine Mountains, has considerable manufactures, and was formerly a part of the pope's dominion. Cap. Forli; pop. (1901) 280,823.

FORLI: interesting city of Italy, cap. of the province of Forli; beautifully situated at the foot of the Apennines, in a fertile plain, on the right bank of the Montone, 16 m. s.w. of Ravenna. It is a well-built, handsome city, surrounded with walls, and contains many striking specimens of architecture, of which the Guerini Palazzo, built after the designs of Michael Angelo, the Palazzo Comunale, the Monte di Pietà, the cathedral, a majestic building, and the churches of S. Philipo Neri, of S. Girolamo, and of S. Mercuriale, are most notable. The ecclesiastical buildings of Forli contain some of the best pictures of Cignani, Carlo Maratti, Guido, and other masters. The citadel, founded 1361, is now used as a prison. The inhabitants carry on silk-spinning and salt-refining, with considerable trade in grain, linen, hemp, carthamus, wood, etc. Forli (anc. *Forum livii*) is said to have been founded by Marcus Livius Salinator, after his victory over Hasdrubal, on the Metaurus, B.C. 207, and to have received its name from him. In the middle ages, it formed a republic, and changed its rulers frequently during the struggles of the Guelphs and Ghibellines. In 1860, Forli, formerly in the States of the Church, became Italian. Pop. (1901) 43,708.

FORLIE, v. *fŏr-lī'* [*for*, and *lie*]: in *OE.*, to overlie. FORLAY, pt. *fŏr-lā'*, overlay.

FORLORN, a. *fŏr-lawrn'* [AS. *forleoran*, to lose, to let go: Ger. *verloren*, lost: Dut. *verliesen*, to lose: Goth. *fralusnan*, forlorn]: destitute; forsaken; solitary; in *OE.*, taken away; small; despicable: N. a forsaken or solitary one. FORLORN'LY, ad. *-lĭ*. FORLORN'NESS, n. FORLORE', a. the old spelling of *forlorn*.—SYN. of 'forlorn': friendless; abject; wretched; pitiable; miserable; lost; abandoned; helpless; hopeless; deserted; despicable.

FORLORN-HOPE, n. *fŏr-lawrn'hōp* [Dut. *verloren-hoop*, lost troop—from Dut. or Ger. *verloren*, lost; Dut. *hoop* (pronounced *hope*), band, troop]: a desperate case; a body of soldiers who volunteer or are selected to attempt a breach, or to lead in scaling the wall of a fortress. The French term is *enfants perdus*. There is ordinarily no lack of volunteers for this dangerous but honorable service.

FORM, n. *fawrm* [F. *forme*, fashion, a long bench—from L. *forma;* It. *forma*, shape, figure: comp. Gael. *fuirm*, manner, fashion; *furm*, a stool]: the shape or external appearance of anything; a pattern; a mold; beauty; stated method; ceremony; manner; ritual; something not essential; a long seat used in a school; British name applied to one of the classes of a great public school, as *first form*, *sixth form*, etc.; types set up ready for printing; the bed or seat of a hare. In *music*, distinctive outline, also rhythmical structure; related to harmony as, in drawing, outline is related to light, shade, and coloring. In *philosophy*, since the time of Plato, the reality of a thing which continues under all changes of appearances: the usual term now is *Idea* (q.v.): V. to shape; to fashion; to mold; to contrive; to combine; to arrange; to make; to constitute; to go to make up. FORMING, imp. *fŏr'mĭng*. FORMED, pp. *fawrmd*. FORMER, n. *fŏr'mėr*, one who. FORMLESS, a. *fawrm'lĕs*, without form. FORMAL, a. *for'măl* [F. *formel*—from L. *formālĭs*]: strictly ceremonious; done in due form; according to regular method; having the form or appearance without the substance or essence; having its proper character; regular; proper. FOR'MALLY, ad. *-lĭ*, in a strict ceremonial manner; stiffly; precisely; essentially. FORMALITY, n. *fŏr-măl'ĭ-tĭ* [F. *formalité*]: ceremony; strict observance of social customs; conformity to customary modes; mode or method. FORMALISM, n. *fŏr'mă-lĭzm*, the form without the substance or essence; dependence on external forms only, as in religion. FOR'MALIST, n. one who regards appearances only; a stickler for forms; a hypocrite. FORMATION, n. *fŏr-mā'shŭn* [F.—L. *formātĭōnĕm*, formation; *formātus*, formed]: the act or manner of forming; generation or production; in *geol.*, an assemblage of rocks, nearly of the same age which have some characters, as of age, origin, or composition, common; e.g. the coal or chalk formation. FOR'MATIVE, a. *-mă-tĭv*, giving form; plastic: N. a word formed from another. IN GOOD OR BAD FORM. among

sporting men, the good or bad condition of a man or horse. IN BAD FORM, in bad taste or manners. IN DUE FORM, with the proper amount of conventional ceremony.—SYN. of 'form, n.': figure, shape; conformation; fashion; structure; configuration; frame; constitution; arrangement; organization; system; way; method; scheme; formula; show; conventionality; formality; shapeliness; elegance; phantom; model; bench; class;—of 'formal': precise; punctilious; stiff; affected; external; outward; starched; ceremonial; ritualistic; regular; methodical; perfunctory.

FORMAL CAUSE. See CAUSE AND EFFECT.

FORMAL LOGIC. See LOGIC.

FORMAMIDE, n. *fawrm'ă-mĭd* [*formate*, and *ammonia*]: a compound intermediate between ammonium formate, and hydrocyanic acid.

FOR'MA PAU'PERIS: legal phrase to signify the arrangements by which an action may be carried on by one who is too poor to sue in the ordinary way. In the event of success, a person suing in this form is entitled to his costs; because his counsel and agent, and the officers of court, though bound to give their labor gratis to him, are not bound to give it on the same terms to his antagonist, unless he too be a pauper.

FOR'MEDON: old form of action, in the law of England, whereby an heir of entail or remainder man who had been ousted by a discontinuance, was entitled to vindicate his claim to the lands from which he had been ousted: it, with other real actions, is now abolished.

FORMEN'TO, FELIX, American surgeon: b. New Orleans, La., 1837, March 16; d. 1907, June 4. He studied at Jefferson College, Louisiana, and the University of Turin, Italy, and was a surgeon in the Franco-Sardinian army during 1859, and in the American Civil War was chief surgeon of the Louisiana Confederate hospital at Richmond, Va. At one time he was president of the American Public Health Association, later president of the Confederation of State and Provincial Boards of Health of North America, and in 1898 was appointed surgeon to the Louisiana Soldiers' Home. His publications include monographs on cremation, military surgery, alcoholics, and other professional subjects.

FORMER, a. *fŏr'mẽr* [AS. *forma*, early, former; compar. of FORE (see FORE, FOREMOST)]: before another or something else in time or order; mentioned before another; past; ancient; in *OE.*, fore; front; first; opposed to *latter*. FOR'MERLY, ad. *-lĭ*, in times past.—SYN, of 'former': preceding; previous; prior; foregoing; antecedent; anterior; earlier; first.

FORMERET, n. *fawr-mẽr-ĕt'* [F.]: in *arch.*, the arch rib, which, in Gothic groining, lies next the wall, and is consequently less than the other ribs which divide the vaulting.

FORMES, *for'mės*, Charles John (popular name Karl F.): 1810, Aug. 7—1889, Dec. 16; b. Mühlheim: singer. He was educated in Vienna aand Cologne and began his musical career as a choir singer. In 1841 he was urged to study for the operatic stage, and he joined the company at the Mannheim Theatre 1843, and the Vienna opera company 1844. Subsequently he appeared in opera in Hamburg, sang in German opera in London 1849, in Italian at Covent Garden and at the London Philharmonic concerts 1850, and began an American tour at the New York Acad. of Music 1857. Later he resided in the United States. His most popular representations were in *Robert le Diable*, *Don Giovanni*, *The Huguenots*, the oratorios of Handel, Haydn, and Mendelssohn, and the dramatic songs of Franz, Schubert, and other German composers.

FORMIC, a. *fŏr'mĭk* [L. *formīcă*, an ant]: pertaining to ants. Formica: see Ant. For'micant, a. *-mĭk-ănt*, in *pathol.*, term applied to the pulse when extremely small, scarcely perceptible, unequal, and communicating a sensation like that of the motion of an ant felt through a thin texture. Formicate, a. *fŏr'mĭ-kāt*, ant-like. For'mica'tion, n. *-kā'shŭn*, a sensation resembling that caused by ants creeping on the skin; somewhat resembling the awaking from numbness; in some cases a symptom of spinal or cerebral disease. Formiate, n. *fŏr'mĭ-āt*, or Formate, n. *fŏr'māt*, a salt of formic acid. Formicary, n. *fŏr'mĭ-kăr-ĭ*, an ant-hill; the interior economy of the habitation of ants. Formicaria, n. plu. *fŏr'mĭ-kā'rĭ-ă*, glass ant-houses for scientific observation.

FORMIC ACID: a monobasic organic acid having the formula CH_2O_2 or H.COOH. When pure, formic acid is a pungent, colorless liquid, boiling at about 212° F. at ordinary atmospheric pressure (its vapor burning with a bluish flame), and freezing at about 47° F. into a white crystalline mass. It is completely resolved by strong sulphuric acid into water and carbon monoxid. $H.COOH = H_2O + CO$. It reduces Fehling's solution (q.v.), and also reduces gold and platinum to the metallic state, from their solutions. When boiled with the nitrates of silver and mercury, formic acid precipitates these metals in the form of grayish metallic powders. The acid takes its name from the fact that it exists, in the free state, in the bodies of red ants (*Formica rufa*), from which it may be obtained by crushing the ants and distilling the mass with water (a process not now used). It may also be obtained by the oxidation of methyl alcohol, as well as of starch, sugar, and other organic substances. The most convenient method of preparing the acid is by heating anhydrous glycerin with crystallized oxalic acid. The reaction is not a simple one, monoformin being one of the intermediate products; but the obvious part of the reaction is that the oxalic acid is converted into formic acid with liberation of carbon dioxid. Both the acid and its salts (which are called formates) are used to some extent as disinfectants and

preservatives. Formic acid is a very common product of the oxidation of organic bodies, the albuminates, glycine, sugar, starch, etc., hence we can readily explain its occurrence as a product of oxidation in the animal organism, in which it frequently occurs, either free or in combination. Thus it is found not only in ants, but also in the poison of the bee and wasp, and in the hairs of the procession caterpillar. It has been detected by various chemists in the sweat, in the expressed juice of the spleen, pancreas, thymus gland, and muscles, in the brain, the blood and the urine.

FORMIC ALDEHYDE, sometimes called methyl aldehyde, or formaldehyde, HCHO, is only known in the form of solution or of vapor. When the latter is condensed it is converted into a white solid polymer (see POLYMERIZATION) called *paraformaldehyde*. Formic aldehyde has an intensely irritating odor and reduces many metals from solutions of their salts, for which purpose it is used in analysis. It is usually prepared by the partial combustion of the vapor of methyl alcohol, as, for example, when a mixture of the latter with air is passed over various heated substances, such as a spiral of platinum wire or a coil of copper gauze and copper oxide. Convenient 'lamps' are now on the market for the production of formic aldehyde by the latter method. Formic aldehyde is readily soluble in water to the extent of 40 per cent; the solution is generally sold under the name 'formalin,' although other terms are employed. Both the solutions and the vapor are extensively used for disinfecting rooms and articles of clothing, etc. The vapor is more effective for this purpose than sulphur dioxide and, unlike the latter, it has no subsequent destructive effects on fabrics, nor has it any bleaching action. Formic aldehyde is the active ingredient in most of the so-called embalming fluids used by undertakers and is extensively employed for the preservation of anatomical and other specimens, and for preserving meat. It acts on the tissues so as to harden them and, therefore, food preserved by its use should not be eaten, or, if it must be consumed, the outer portion should be removed before cooking. The addition of formic aldehyde to milk is often made by unscrupulous dealers, as it is, of course, much cheaper to do this than to keep the milk fresh by means of ice. Milk so treated is highly indigestible and is a fertile source of sickness and death to infants and invalids who are fed upon it. Healthy adults, as a rule, escape these effects because they seldom take any large quantity of milk. The solutions of formic aldehyde sold for preserving milk are often termed 'frigine' or some such name, the use of which disguises the nature of the liquid from the ignorant user and enables the seller to obtain a much higher price for his liquid.

Formic aldehyde is formed in minute quantities in those parts of plants containing chlorophyll. It is probably an intermediate product in the conversion, by the plant, of carbon dioxide into starch (vide VEGETABLE PHYSIOLOGY).

It is, however, highly destructive to vegetable life, and consequently it never accumulates in any large quantity in the plant tissues, but is converted into other substances almost as fast as it is formed. Chemically, formic aldehyde is of great importance because it is used directly and indirectly to synthesise a large number of compounds. Moreover, it is closely related to METHYL ALCOHOL (q.v.) and to FORMIC ACID (q.v.). Being the simplest ALDEHYDE (q.v.) it is regarded as being theoretically, the parent substance from which all the other members of this class of compounds are derived.

PARAFORMIC ALDEHYDE (paraform aldehyde, paramethyl aldehyde) is sometimes sold in the form of pastilles or cones, which are burnt for the purpose of generating formic aldehyde vapor. It is a colorless, slightly crystalline compound, which passes into formic aldehyde when sufficiently heated. Of course, the portion which actually burns does not form formic aldehyde, so that this method is not economical, though convenient where small quantities of formic aldehyde are needed occasionally.

FORMICARIIDÆ, n. *fawr-mĭ-kär-ī′ĭ-dē* [L. *formica*]: ant-thrushes; family of birds by some called *Formicarinæ*, and allowed only the position of a sub-family of *Turdidæ* (thrushes). The wings and tail are much shorter than those of the true thrushes, the tip of their bill also is often slightly hooked. They inhabit for the most part the tropical regions of both hemispheres, frequenting forests and thickets, flying feebly from shortness of wing, and consequently most at home on the ground, where they devour ants, coleoptera, etc. The typical genus *Formicarius* is of sober tints, while *Pitta* is of a brilliant azure blue. The Dipper or Water Ouzel (*Cinchus aquaticus*) is an aberrant form of the family or sub-family.

FORMICINA, n. *fawr-mĭ-sĭ′na* [L. *formica*, an ant]: genus of *Formicidæ*, a genus of aculeate hymenoptera, tribe or sub-tribe *Heterogyna*. *Formicina rufa* is the horse ant. It forms large nests of dry leaves and sticks, in woods.

FORMIDABLE, a. *fŏr′mĭ-dă-bl* [F. *formidable*—from L. *formidābĭlĭs*, causing fear—from *formidārĕ*, to fear: It. *formidabile*], exciting fear or dread; dreadful.

FORMOSA, or TAIWAN, a Japanese dependency and island off the s.e. coast of China, 90 m. distant from the province of Fo-Kien. Formosa was ceded to Japan by the Chinese as a consequence of the war of 1894–95, and under the new administration is rapidly progressing in modern civilization. Area 13,458 sq. m. Chief towns Taiwan City, Tamsui, and Kelung.

The Chu-shan chain of mountains almost bisects the island, the highest peaks Mu-Kang Shang or Mount Morrison and Mount Sylvia being respectively 14,362 ft. and 11,380 ft. above sea-level. East of the range a narrow strip of hilly country fronts the Pacific with a precipitous cliff-wall, in many places from 3,000 to 7,000 ft. high.

FORMOSA.

The island is noted for its forests of valuable trees, camphor, teak, bamboo, palms, etc., and for its luxuriant vegetation. Agriculture is the principal industry; tea is extensively cultivated in the n., and the rice trade employs many vessels; other products are wheat, corn, sugar-cane, oranges, guavas, pineapples, cocoanuts, grapes, pomegranates, bananas, camphor, cinnamon, pepper, etc.; in the s. the staple crops are sugar and turmeric. Formosa also has considerable mineral wealth, gold, silver, coal, and sulphur being mined for export. In recent years the exports to Japan amount annually to about $5,215,650 and $6,195,562 to other countries, tea being valued at $2,885,-374, and camphor at $1,099,660. The annual imports of varied merchandise amount to $5,078,150 from Japan and $6,419,220 from other countries. Between 1850 and 1900 foreign vessels aggregating over 184,230 tons annually visited the ports of Formosa. Under Japanese administration govt. savings and other banks have been opened, postal and telegraph offices connected by over 2,600 miles of wire, roads constructed throughout the island, and over 300 miles of railway are in operation.

The inhabitants comprise aboriginal tribes, Chinese and Japanese settlers. The aborigines are slender, long-haired and olive-complexioned. Portuguese were the first Europeans to visit and name the island. Spanish settlement was frustrated by the Dutch, who maintained a precarious holding from 1624 to 1662, when they were driven out by Chinese. Formosa was opened to foreign trade in 1858. The Japanese occupation in 1896 was strongly opposed; but firm and just measures achieved pacification by 1902.

Since the cession of Formosa to Japan by China in the peace treaty of 1895 a great transformation in the condition of the island and its people has been effected—the task of establishing law and civilization among its savage inhabitants, a task abandoned as hopeless successively by the Spaniards, the Dutch, and the Chinese, having been taken up by the Japanese government and executed with the vigor and foresight characteristic of that nation. At the coming of the Japanese the coasts of the island were at the mercy of pirates, and the interior was peopled by savage aborigines who plundered ships wrecked on the coasts and murdered the crews. To subjugate these barbarians by force of arms was the labor of a year, and then the island was placed under civil administration; but there were frequent revolts till 1901, when resistance was finally put down by the strong hand. Japan then entered on a policy of wise conciliation under Japanese law, as far as that could be enforced without seriously conflicting with the prejudices of the inhabitants. Thus, though Japanese settlers are liable to severe penalties for consuming opium, those penalties are not exacted of the natives, who are much given to the opium habit; but the government takes to itself the monopoly of opium and judiciously uses it as a means of discourag-

ing opium smoking; opium is sold only to confirmed habituates, and under strict surveillance by the police, and physicians and schoolmasters are required to impress upon the people the injurious consequences of the use of the drug. In a population of 3,000,000 there were 169,-064 opium smokers, Sept., 1900, but the number had fallen to 152,044 in March, 1902; and whereas the opium import of 1900 amounted to 3,392,602 yen in value, in 1903 it amounted to only 1,121,455 yen.

Before Japanese occupation of the island the mortality from epidemic diseases caused mainly by impure water was great; to remedy this evil the Japanese bored a great number of artesian wells, 800 in the Taihoku dist. alone, which contains about one-tenth of the population. Statistics for the rest of the island are not available.

Popular education, beginning with absolutely nothing, has made great progress; there are, for the Japanese settlers schools with 60 teachers and 2,000 pupils; and 130 elementary schools for the natives conducted by 521 teachers who instruct 18,149 children; also already there have been established for the use of the natives a school of medicine, a Japanese language school, and a training school for teachers.

There were no roads in the island till the Japanese arrived, though, curiously, there was one short stretch of railway, on which trains were run 'when convenient.' Already the govt. has made over 1,000 miles of good roads, and has approved a scheme of railways to cost about $15,-000,000. The absurd little Chinese railway has been thoroughly reconstructed, and 95 miles of new railways had been constructed at the end of 1903. Also 125 miles of light railways were built before 1903. There were in 1902, 87 postoffices handling 13,285,195 letters and postcards; and 336,295 domestic and foreign money orders were issued. Of telegraph wires, in 1902, there were 2,800 m. and of telephone wires 1,350 m.

By improved methods of agriculture brought in by the Japanese, the production of rice was increased 10 p. c. 1896–1902; in the same period the production of tea was increased five fold; the other agricultural staple products, as sugar, sweet potatoes, cane, ramie, jute, turmeric, etc., show very large increase. Because of reforms introduced by Japan the production of camphor, which, 1897, was 1,534,596 kin, rose to 3,588,814 kin in 1903, and that of camphor oil from 638,603 kin to 2,670,561. Millions of young camphor trees have been planted.

There is a central bank, and there are private banking offices in the more important centers. Postoffice savings banks in 1902 served 41,145 depositors. Manufactures of various kinds have been introduced. The general revenue, derived principally from govt. works and undertakings, the opium monopoly, customs, and various taxes, was increased ten fold 1896–1903; and, 1898–1902, the local revenue from taxes on land, houses, businesses, etc., was nearly trebled. Pop. (1903) 3,082,404.

FORMS OF ADDRESS: proper phraseology in addressing letters to persons distinguished officially or otherwise. In Great Britain, etiquette in this department is much more strict than in the United States, though far less so than in the last generation and times preceding. The forms are frequently modified between persons of equal rank; and in converse among intimate friends and kindred they are now mostly dispensed with, though retained in addressing letters. The ceremonious modes of address proper in Britain are given below—from Dod's *Peerage and Baronage*. In using these, it is in many cases necessary to bear in mind any hereditary, personal, or official distinctions, by which the rank may be modified.

1. *Archbishop*—Letters are addressed: 'His Grace, the Lord Archbishop of——,' and commence: 'My Lord Archbishop.' More formal documents are addressed 'The Most Reverend Father in God (John Bird), by Divine Providence, Lord Archbishop of Canterbury;' other archbishops and suffragan bishops being 'by Divine permission.' When personally referred to, an archbishop is styled 'Your Grace,' not 'Your Lordship.' The Archbishop of Armagh is addressed as 'His Grace the Lord Primate of Ireland.'

Archbishops' wives, and other members of their families, as such, are without titles.

2. *Baron*—Addressed: 'The Right Honorable Lord——;' referred to as 'His Lordship,' or 'Your Lordship.'

Baron's Daughter—'The Honorable Mary——;' or, if married, 'The Honorable Mrs.——.' Letters commence, 'Madam.'

Baron's Son—'The Honorable John——.' Letters commence, 'Sir.'

Baron's Son's Wife—'The Honorable Mrs ——.' Letters commence, 'Madam.'

Baron's Wife, and *Baroness* in her own right—'The Right Honorable Lady——;' in strictness, but more commonly, 'The Lady——.' Letters commence, 'Madam,' and refer to her as 'Your Ladyship.'

Baronet—'Sir John——, Bart.' Letters commence, 'Sir.'

Baronet's Wife—'Lady——.' Unless she has a title as the daughter of a peer, no Christian name is used. She is referred to as 'Your Ladyship.'

Bishop—'The Right Reverend the Lord Bishop of ——.' Letters commence, 'My Lord.' Frequently the address is simply, 'The Lord Bishop of ——.' The style in formal documents is, 'The Right Reverend Father in God (John ——), by Divine permission, Lord Bishop of ——.' Scotch bishops are addressed The Bishop of ——, sometimes as 'The Right Reverend Bishop (e.g., Henry Cotterell)', and letters commence, 'Right Reverend Sir.' The colonial bishops are addressed by their territorial titles like those of England.

Bishops' Wives and Children have no titles.

Countess—'The Right Honorable the Countess of ——.' Letters commence, 'Madam,' and refer to her as 'Your Ladyship.'

Duke—'His Grace the Duke of ——.' Letters com-

mence, 'My Lord Duke;' and he is referred to as 'Your Grace.'

Duchess—'Her Grace the Duchess of ——.' Letters commence, 'Madam,' and refer to her as 'Your Grace.'

Duke's Daughter—'The Right Honorable Lady Mary ——,' or less formally, 'The Lady Mary ——.' Letters commence, 'Madam,' and refer to her as 'Your Ladyship.' If she is married to a person of inferior rank, her surname only is changed.

Duke's Eldest Son—Uses the second or some other title of his family by courtesy, and he is addressed as if he held the title by law, though in formal documents he is called '——, Esq., *commonly called* the Marquis or Earl' (as the case may be).

Duke's Younger Son—'The Right Honorable Lord John Russell,' or less formally, 'The Lord John R ——.' 'My Lord, and 'Your Lordship.'

Duke's Younger Son's Wife—'The Lady John ——', unless where she has a title in her own right. 'Madam,' and 'Your Ladyship.'

Earl—'The Right Honorable the Earl of ——,' or less formally, 'The Earl of ——.' 'My Lord,' and 'Your Lordship.'

Earl's Wife—see *Countess*.

Earl's Daughter—Like Duke's Daughter (q.v.).

Earl's Eldest Son is addressed as if the title which he holds in courtesy were a title in law.

Earl's Younger Son—Like Baron's Son (q.v.).

Earl's Younger Son's Wife—Like Baron's son's wife, unless of superior rank to her husband.

KING—'The King's Most Excellent Majesty.' 'Sire,' and 'Your Majesty;' or, in less formal notes, thus: 'Mr. Pill presents his duty to your Majesty.'

Knight Bachelor—Like Baronet (q.v.), except that the word 'Bart.' is omitted.

Knight Bachelor's Wife—Like Baronet's Wife (q.v.).

Knight of the Garter—K.G. is added to the name or other title of the bearer.

Knight of St. Patrick—K.P. used in the same manner.

Knight of the Thistle—K.T.

Knight of the Bath—if a Knight Grand Cross, K.G.C.B.; if a Knight Commander, K.C.B.

Knight of the Bath's Wife—Like the wife of a Baronet or Knight Bachelor.

Lord Advocate (of Scotland)—'The Right Honorable the Lord Advocate' by courtesy; but in official documents he is styled 'Her Majesty's Advocate for Scotland.' Letters ought strictly to commence, 'Sir,' not 'My Lord,' though the latter mode of address is usual.

Lord Lieutenant (of Ireland)—'His Excellency the Lord Lieutenant;' and letters commence in accordance with his rank in the peerage or otherwise. If a duke, he is styled 'His Grace the Lord Lieutenant.'

Lord Mayor —'The Right Honorable the Lord Mayor.' 'My Lord,' and 'Your Lordship.' There are only three Lord Mayors—those of London, York, and Dublin.

Lord Provost—The Provost of Edinburgh is 'The Right Honorable the Lord Provost; of Glasgow, 'The Honorable the Lord Provost;' of Perth and of Aberdeen, 'The Lord Provost.' There are no other Lord Provosts. Perhaps the distinction in the title of the chief magistrate of the Scottish capital is traceable to his having been always a member of the Privy Council of Scotland, at least since the Revolution.

Lord of Session (in Scotland)—'The Honorable Lord ——.' 'My Lord,' and 'Your Lordship.'

Lords of Her Majesty's Treasury—These in their collective capacity are addressed as 'The Honorable the Lords Commissioners of Her Majesty's Treasury;' individually they have no title from their connection with the Treasury.

Maid of Honor—'The Honorable Miss;' and 'Madam.'

Marquis—'The Most Honorable the Marquis of ——,' *not* 'The Most Noble.' Letters commence 'My Lord Marquis;' but when personally addressed, he is styled 'My Lord,' and 'Your Lordship.'

Marchioness—'The Most Honorable the Marchioness of ——.' 'Madam,' and 'Your Ladyship.'

Marquis's Daughter—Like Duke's Daughter (q.v.).

Marquis's Eldest Son—Like Duke's Eldest Son (q.v..)

Marquis's Younger Son, like Duke's Younger Son (q.v.).

Mayors—In formal documents, 'The Right Worshipful the Mayor——;' but in letters, simply 'The Mayor.'

Members of Parliament—The letters M.P. are added to their usual address.

Officers in the Navy and Army—Their rank in the service, if above subalterns, is always prefixed to any other title they may possess, thus: 'Captain the Lord John ——.'

Prince—'His Royal Highness Prince ——;' or 'His Royal Highness the Duke of ——,' when the Prince is also a Duke. In practice, the initials H.R.H. are usually substituted for the words. A letter begins 'Sir,' not 'My Lord Duke;' and the mode of reference is 'Your Royal Highness.'

Princess—'Her Royal Highness the Princess ——,' or 'The Duchess' (as the case may be). 'Madam,' and 'Your Royal highness.'

Prince's Wife, though of inferior rank, like a Princess by birth.

Privy Councillor—'The Right Honorable John ——.'

Privy Councillor's Wife and Children have no title.

QUEEN—'The Queen's Most Excellent Majesty.' 'Madam,' and 'Your Majesty;' or, 'The Lord John R —— presents his duty to your Majesty.'

Viscount—,' 'The Right Honorable Lord Viscount ——,' or less formally, 'The Lord Viscount.' 'My Lord,' and 'Your Lordship.'

Viscountess—'The Right Honorable the Viscountess,' or less formally, 'The Viscountess.' 'Madam,' and 'Your Ladyship.'

Viscount's Daughter, like Baron's Daughter (q.v.).

Viscount's Son, like Baron's Son (q.v.).

Viscount's Son's Wife, like Baron's Son's Wife (q.v.)

The constitution of the United States provides that no title of nobility shall be granted by the govt., and that no person holding any office of profit or trust under it, shall, without the consent of Congress, accept any title, etc., from any king, prince, or foreign state. The pres. of the United States and the gov. of Mass. are the only citizens possessing as officials a title by legislative act, and in both cases the word is 'Excellency.' Govs. of other states are given the same title by courtesy. When either of these is addressed in writing or officially spoken of, the form is 'His Excellency the President of the United States, or 'His Excellency the Governor of ——;' and when spoken to 'Your Excellency.' Judges of federal, state, and municipal courts, members of both houses of congress, of state legislatures, and of the president's cabinet, and frequently members of municipal councils are addressed in writing by the courtesy title 'Honorable,' contracted to 'Hon.', and in most cases the name of office follows that of the person, such as 'Hon. ——, U. S. Senate;' 'Hon. ——, Chief Justice of the (Supreme Court of the) United States;' 'Hon. ——, M. C.' Associate justices of the U. S. supreme court and of state, supreme, and superior courts, are addressed in writing with 'Hon.', name, and name of office, but spoken of as 'Mr. Justice ——. Officers of the army and navy are addressed in writing by name followed with title of highest rank attained, and, if in command of a military division, naval squadron on station, or on the retired list, by designation of the fact, such as '—— Major General, U.S.A., commanding military division of the Atlantic;' '—— Rear-Admiral, U.S.N., commanding European Squadron;' '—— General U.S.A. Retired.' All official communications of the govt. begin 'Sir.'

Recipients of regular and honorary degrees should be addressed in writing by name, followed by abbreviation of degree in the order A.B., A.M., Ph.D., M.D., D.D., LL.D. A physician or surgeon is spoken of and to as 'Dr. ——;' clergyman is addressed in writing and spoken of usually as 'The Rev. ——' spoken to as 'Mr. ——;' if a doctor of divinity he may be addressed in writing as '——, D.D.', or 'The Rev. ——, D.D., and spoken to and of as 'Dr. ——.' A Rom. Cath. cardinal is addressed in writing and spoken of as 'His Eminence ——, Cardinal (Bishop, Priest, or Deacon according to rank) of the Holy Roman Church,' and spoken to as 'Your Grace:' an archbishop and bishop may be similarly addressed as 'The most Rev. ——, D.D., archbishop of ——', and 'The Right Rev. ——, D.D., Bishop of ——.' In the Prot. Episc. Church, bps. are addressed the same as in the Rom. Cath. Church; and in the Meth. Episc. Church as 'The Rev. Bishop ——, D.D.'

Foreign ambassadors to the United States are addressed officially by the titles recognized in their own countries, and if they have no title as 'Mr. ——,' followed with title of office; and U.S. ambassadors to foreign countries, officially as 'Mr.' otherwise 'Hon. ——.' Some grades

of lawyers as well as justices of the peace are addressed in writing and spoken of in legal documents as '—— Esq.', and any gentlemen may be similarly addressed, though 'Mr. ——' is preferable. Social custom adds the titles of various officials to the names of their wives when used in introductions or conversation: Mrs. President ——, Mrs. Justice ——, Mrs. Governor ——, but the usage does not extend to daughters. The disposition on the part of the govt. and the most cultured citizens is to ignore titles as far as propriety will permit.

FORMS OF PROCEDURE: see PROCESS.

FORMULA, n. *fŏrm'ū-lă*, FORM'ULÆ, n. plu. *-ū-lē*, or FORM'ULAS, n. plu. *-ū-lăs* [L. *formŭlă*, a fine form—from *forma*, a shape: It. *formula:* F. *formule*]: the symbol or symbols expressing the composition of a body; a prescribed form or rule; a general expression for resolving problems; a confession of faith. FORM'ULARY, n. *-lĕr-ĭ*, a book containing prescribed forms, as of prayers, etc.; a ritual. FORM'ULE, n. *-ūl*, a formula. FORM'ULATE, v. *-ū-lāt*, to reduce to a formula; also FORM'ULIZE, v. *-līz*. FORM'ULATING, imp. FORM'ULATED, pp. FORM'ULIZING, imp. FORM'ULIZED, pp. *-līzd*.

FORMYLE, n. *fŏr'mĭl* [L. *formīcă*, an ant; Gr. *ūlē*, the material of which a thing is made]: the hypothetical base of *formic* acid: see FORMIC and CHLOROFORM.

FORNACE, n. *fŏr'năs*, or FOR'NEYS, n. *-nĭs*: old spellings of FURNACE.

FORNICATE, v. *fŏr'nĭ-kāt* [L. *fornĭcātus*, vaulted, arched; *fornĭcātĭōnem*, an arching over—from *fornix*, an arch or vault, a brothel—as being at Rome usually under ground]: to commit lewdness, as between unmarried persons. FOR'NICA'TION, n. *-kā'shŭn*, commerce between unmarried persons; figuratively idolatry. FOR'NICATOR, n. *-tĕr*, an unmarried man having commerce with an unmarried woman; an idolater. FOR'NICA'TRESS, n. *-trĕs*, an unmarried woman guilty of lewdness.—*Fornication*, in most countries, has been a crime brought within the pale of positive law at some period of their history, and prohibited by the imposition of penalties more or less severe; but it has always been found ultimately more expedient to trust to the restraints which public opinion imposes on it in every community which is guided by the principles of morality and religion.—In England, in 1650, during the ascendency of the Puritan party, the repeated act of keeping a brothel or committing fornication was made felony without benefit of clergy on a second conviction. At the Restoration, when the crime of hypocrisy seemed for a time to be the only one which, under the influences of a very natural reaction, men were willing to recognize, this enactment was not renewed; and though notorious and open lewdness, when carried to the extent of exciting public scandal, continued, as it had been before, an indictable offense at common law, the mere act of fornication itself was abandoned 'to the feeble coercion of the spiritual court, according to the rules of the canon law, a law which has treated the offense of

incontinence with a great deal of tenderness and lenity, owing perhaps to the constrained celibacy of its first compliers.'—*Blackstone.* The proceedings of the spiritual court were regulated by 27 Geo. III. c. 44, which enacts that the suit must be instituted within eight months, and that it cannot be maintained at all after the marriage of the parties offending. But proceedings in the ecclesiastical courts for this offense have now fallen into entire desuetude (Stephen's *Com.* iv. 347).—In Scotland, shortly after the Reformation, fornication was prohibited by what Baron Hume calls 'an anxious statute of James VI.' (1567 c. 13), entitled 'Anent the Filthie Vice of Fornication, and Punishment of the samin.' This act, passed in the same parliament by which incest and adultery are punished with death, provides that the offender, whether male or female, shall pay for the first offense a fine of £40 Scots, and shall stand bareheaded, and fastened at the market-place, for the space of two hours; for the second, shall pay a fine of 100 merks, have the head shaven, and shall be exposed in the same public manner; and for the third, pay a fine of £100, be thrice ducked in the foulest pool of the parish, and be banished the town or parish for ever. There is but one instance of this statute having been enforced by the court of justiciary, which occurs, as might be supposed, during the government of the Protector in Scotland. See NUISANCE: PROSTITUTES.

FORNIX, n. *fawr'nĭks* [L. a vault, an arch]: in *anat.*, any part shaped like an arch or vault, as the *fornix conjunctivæ*, the globe of the eye; in *bot.*, the lamellæ of the corolla, in some plants like Cynoglossum, which are small, scale-like, and overarch the orifice of the tube; in *conch.*, the excavated part under the umbo or beak; the upper or convex shell in the oyster. FORNIX OF THE CEREBRUM, thin layer of white brain-substance in the floor of each lateral ventricle.

FORPASS, or FOREPASS, v. *fŏr-păs'* [*for*, and *pass*]: in *OE.*, to pass unnoticed; to go by.

FORPET, n. *fŏr'pĭt:* in *Scot.*, a measure, the fourth part of a peck.

FORPINE, v. *fŏr-pīn'* [*for*, and *pine*]: in *OE.*, to waste away.

FORRA- (or FORROW-) COW, n. *fŏr'ră-* or *fŏr'rō-kow:* in *Scot.*, a cow not in calf, and continuing to give milk after the usual time.

FORRAY, n. *fŏr'ā:* another spelling of FORAY, which see, and FODDER.

FORRES, *fŏr'ĕs:* royal burgh in the county of Elgin or Moray, Scotland, on a well-marked old sea-terrace and promontory, about two m. from the mouth of the river Findhorn (q.v.). It was a royal burgh in the reign of King David I. (1124–53), and was subsequently the seat of the Archdeacon of Moray. A painting of St. Laurence holding in his hand the gridiron on which he is said to have been roasted, is preserved at Brodie House near F. The

antiquities of the place are the remains of its castle, at the w. end of the town, and the remarkable sculptured pillar—25 ft. high—called sometimes Sueno's Stone, but more commonly 'the Stan'in Stane,' about a mile eastward. F. lies at the foot of a curiously formed group of four gravelly hills, named the Cluny or Cleeny Hills, evidently water-made, on the highest of which, the site of an old encampment, is a tower 66 ft. high, erected to the memo y of Nelson 1806. On one of these eminences is an excellent hydropathic establishment called Cluny Hill House. Pop. about 4,100.

FORREST, *fŏr'ĕst*, Edwin: 1806, Mar. 9—1872, Dec. 12; b. Philadelphia: actor. He received a common-school education, made his first appearance on the stage as an amateur as Young Norval in *Douglass* before he was 12 years old, and as a professional at the Walnut Street Theatre, Philadelphia, in the title role of the same play 1820, Nov. 27. He achieved immediate success, and at the close of his opening engagement started on a long tour of the western and southern cities, during which he studied and appeared in a number of Shakespearean characters. On his return north he played a few evenings in Philadelphia and Albany and then, 1828, Nov., made his first appearance in New York at the old Bowery Theatre in the character of Othello. He there made a grand impression, and when, at the close of his engagement, he made a tour of the large cities, he was everywhere received with demonstrations of enthusiasm. After these triumphs he made a trip to Europe for recreation and study, returned 1831, and played till 1836, Sep., when he undertook a professional visit to England. He played in Drury Lane Theatre 10 months, appearing as Spartacus in *The Gladiator*, Othello, Macbeth, and King Lear; and was entertained with much cordiality. A warm friendship sprang up between him and William Charles Macready, the English actor, which was unfortunately broken during Forrest's visit to England 1845. Forrest had been hissed while playing Macbeth in London and ascribed the act to Macready's jealousy, and when the latter was playing Hamlet in Edinburgh Forrest hissed him from a private box. In 1849, May, while Macready was playing Macbeth in the Astor-place opera house, New York, friends of Forrest made a demonstration of hostility which led to a riot in which 22 persons were killed and 36 wounded. In the following year his wife instituted her celebrated divorce suit, and after two years of stubborn, legal fighting gained it. In 1853 Forrest retired from the stage for a while; in 1865 he had a stroke of paralysis; in 1871, Feb., he made his last appearance in New York in *Richelieu* and *King Lear;* and the following month his last appearance as an actor, in Boston. He bequeathed his Philadelphia house and his property to trustees for the creation and maintenance of a home for aged actors.

FORREST, Sir John: Australian explorer and politician: b. Western Australia 1847, Aug. 22. He entered

the survey department of Western Australia in 1865, and in 1874 was at the head of a party which explored the interior from Champion Bay on the west to the overland telegraph line connecting Adelaide on the south with Port Darwin on the north coast. After holding various government posts he was returned unopposed in 1890 to the first Western Australia Legislative Assembly for Bunbury, and became the first premier and treasurer of the colony. In 1897 he presided over the Federal Council of Australia, and was postmaster-general of Australia 1900–1. His publications are: *Explorations in Australia* (1876); and *Notes on Western Australia* (1884–7).

FORREST, Nathan Bedford, American soldier: b. Bedford County, Tenn., 1821, July 13; d. Memphis, Tenn., 1877, Oct. 29. Moving with his father to Marshall County, Miss., he was in a short while, by the death of his father, left to support his mother and family as best he could with a small hill farm. He undertook this work with devotion and energy, and, getting into business in Memphis, became able to purchase a large plantation, and was at the outbreak of the Civil War one of the wealthiest planters in Tennessee. On 1861, June 14, he entered the Confederate service as a private in White's mounted rifles, but soon obtained authority to raise a regiment, which he did, purchasing at his own private expense its equipment in Louisville, Ky. These supplies he carried to Memphis, displaying remarkable ingenuity and daring both in eluding the Federal authorities and in defeating a body of their troops with 75 Kentucky Confederates who had come to his assistance. Joining his regiment to the force defending Fort Donelson in 1862, February, he was distinguished in the fighting at that point, and, when his superiors had determined upon surrender, led his men through a sheet of icy water past the Federal lines and escaped. Joining Albert Sidney Johnston (q.v.), he was distinguished at Shiloh, where he received a painful wound, which, however, did not long keep him from the field; and by a series of successful movements in Middle Tennessee, then occupied by the Federals, he rapidly rose to great distinction as a cavalry leader, and on 1862, July 21, was promoted brigadier-general. During Bragg's Kentucky campaign he performed great services both on the advance and retreat. Among his most famous exploits in Middle Tennessee was the expedition in which, with less than 1,000 men, he captured McMinnville, and, surprising a garrison of 2,000 Federals at Murfreesboro, captured all the survivors of the fight, including Gen. Crittenden. On 1863, May 8, he captured a raiding force of Federals under Gen. Streight, near Rome, Ga., the Federal force being so much larger than his own that he pressed into service all the citizens in reach in order to form an adequate guard.

After highly distinguished service at the battle of Chickamauga, he was so dissatisfied with the failure to reap the full fruits of that great victory that he tendered his resignation. This was not accepted, but, instead, he was

promoted major-general and assigned to the command of all the cavalry in West Tennessee and North Mississippi. Entering West Tennessee with a small force, he was reinforced by several thousand hardy volunteers, who, with his veteran troops, were soon welded into an invincible body known as 'Forrest's cavalry.' In 1864, February, he routed Gen. S. Smith at Okatona, Miss.; then swept northward through Tennessee to the Ohio River, capturing Fort Pillow, Union City, and other posts, with their garrisons. In 1864, June, with a much smaller force than the enemy, he defeated Gen. Sturgis at Brice's Cross Roads (or Tishamingo Creek), near Guntown, in North Mississippi, capturing all his trains and a third of his men. Gen. A. J. Smith then advanced against him, but after fighting a desperate battle at Harrisburg, near Tupelo, in Mississippi, retreated. Receiving reinforcements from Memphis, Smith advanced again, but Forrest foiled him by making a 60-hour ride to Memphis with half of his force, and by his daring entry into that city compelled Smith's rapid retreat. Then Forrest made havoc with Federal transportation, capturing garrisons and depots in Tennessee, and crowning his exploits by the capture and destruction of $6,000,000 worth of Federal supplies and a gunboat fleet at Johnsonville. Upon Hood's advance into Tennessee, Forrest joined him at Florence and performed important services. As commander of the rear guard of the Confederate army during the retreat from Nashville, his display of heroic qualities and brilliant leadership increased his already great fame. In 1865, February he was promoted lieutenant-general, and to him was assigned the duty of guarding the Confederate frontier from Decatur, Ala., to the Mississippi River. The surrender of the remnant of his command took place on 1865, May 9. During his career he had captured 31,000 prisoners. After the War he returned to civil life.

FOR'REST, URIAH: 1756–1805, July; b. St. Mary's co., Md.: soldier and legislator. He joined the Md. militia early in life, attained the rank of lieut.col. 1776, was wounded at Germantown and Brandywine, and after the revolutionary war was elected auditor of Md., member of both branches of the legislature; was member of congress 1786–7, 1793–95; was maj.gen. of militia; and was clerk of the circuit court of the D. C. 1800 till death.

FORSAKE, v. *fŏr-sāk'* [AS. *forsacan*, to oppose, to refuse—from *for*, away; OE. *sake*, dispute: AS. *sacan*, to contend]: to desert; to abandon; to depart from; to leave. FORSA'KING, imp.: N. act of deserting. FORSOOK', pt. *-sûk*, did forsake. FORSA'KEN, pp. *-sā'kn:* ADJ. deserted; abandoned; destitute.—SYN. of 'forsake': to relinquish; desert; quit; assert; reject; renounce; give up; leave; depart; withdraw.

FORSAY, v. *fŏr-sā'* [*for*, and *say*]: in *OE.*, to forbid; to renounce. FORSAYD', or FORSAID', pp. *-sād'*, forbidden.

FORSE, n. *fōrs:* the old and provincial spelling of *force*, a waterfall. See FORCE.

FORSH'EY, Caleb Goldsmith, American engineer: b. Somerset County, Pa., 1812, July 18; d. Carrollton, La., 1881, July 25. He was educated at Kenyon College, Ohio, and the United States Military Academy, was professor of mathematics and civil engineering in Jefferson College, Mississippi, 1836–8, and from 1851–3 was engineer-in-charge of the governmental survey of the Mississippi delta. Though actively opposed to the secession movement, he became lieutenant-colonel of Confederate engineers upon the withdrawal of Texas from the Union. He collaborated in *The Physics of the Mississippi River* (1861).

FORSKAL, *fôr'skâl*, Peter, Swedish botanist: b. Helsingfors, 1732, Jan. 11; d. Djerim, Arabia, 1763, July 11. In 1761 he was selected by Frederick V. of Denmark to join the scientific expedition to Arabia, to take charge of the department of natural history. He set out on this expedition with Niebuhr, Von Haven, and Kramer, and collected plants in the environs of Marseilles, of which he published a *Flora* at Malta. Niebuhr collected Forskal's papers, accompanied them with remarks, and published them under the titles: *Descriptiones Animalium, Avium, Amphibiorum, Piscium, Insectorum, quæ in Itinere Orientali observavit P. Forskal* (1775); *Flora Ægyptiaco-Arabica*, etc.; *Icones Rerum Naturalium, quas in Itinere Orientali depingi curavit Forskal* (1776).

FORSLACK, v. *fŏr-slăk'* [*for*, and *slack*]: in *OE.*, to neglect from dilatoriness or sloth; to miss the proper occasion of doing.

FORSLOW, v. *fŏr-slō'* [*for*, and *slow*]: in *OE.*, to hinder; to delay; to loiter.

FORSOOTH, ad. *fŏr-sôth'* [AS. *for*, for; *soth*, truth]: in fact; certainly—used in contempt or irony.

FORSPEAK, v. *fŏr-spēk'* [*for*, against, and *speak*]: in *OE.*, to speak against; to forbid; to bewitch.

FORSPENT, v. See Forespent.

FORS'TER, Johann Georg Adam (commonly known as George Forster): traveller and naturalist: 1754–94; b. Nassenhuben, near Danzig; eldest son of Johann Reinhold Forster. When only 17 years of age, he accompanied his father in Captain Cook's second voyage; and shortly after his return, he published, with the assistance of his father, an account of the expedition. Humboldt spoke of this work in the highest terms. Forster, for a time prof. of nat. history at Cassel and at Wilna, was librarian to the elector when Mainz was taken by the French 1792. He had become an ardent republican, and was sent as a deputy to Paris, to request the incorporation of Mainz with the French republic. While he was in Paris on this mission, the Prussians retook the city, and Forster lost all his property, including his books and manuscripts. He died at Paris. His widow, the daughter of Heyne (Therese Huber), published his *Letters*, 1828; and a complete ed. of his works, 9 vols., was published 1843.

FORS'TER, JOHANN REINHOLD: 1729–98; b. Dirsehau, Prussia: traveller and naturalist. He was educated at Halle and Danzig for the clerical profession, and in 1753 became pastor at Nassenhuben, near Danzig; but he seems to have given most of his time to the study of mathematics, nat. philosophy, nat. history, and geography. In 1765, he was appointed by the Russian government to inspect the new colonies on the banks of the Volga; and his report is said to have given to Empress Catharine suggestions for her great code of laws. His irritable temper soon involved him in difficulties with the Russian gov.; and in the following year he repaired to England, and became a teacher of nat. history, and of the French and German languages, at an educational institution for dissenting ministers at Warrington, Lancashire. In 1772, he went as naturalist to Capt. Cook's second expedition to the South Seas. His temper seems to have frequently brought him into collison with the other officers; and after the return of Captain Cook's vessels 1774, July, a controversy arose between Forster and Lord Sandwich on the question as to who should write the narrative of the voyage. In 1776, in association with his son, Forster published a work (in Latin) on the botany of the expedition; and in 1778 his *Observations faites dans un Voyage autour du Monde sur la Géographie Physique, l'Histoire Naturelle, et la Philosophie Morale.* In the latter year, he returned to Germany, and was soon afterward made prof. of nat. history and mineralogy at Halle, where he remained until his death. Besides the above works, he published *De Bysso Antiquorum*, 1775; *Zoologia Indica*, 1781; *Geschichte der Entdeckungen und Schiff-fahrten im Norden*, 1784 (Eng. and French trans.), etc.

FORS'TER, JOHN: 1812–76: b. Newcastle, England: political and historical writer. He was educated for the bar, but early turned to periodical writing, in which he showed more than usual ability; attracting much attention by his political articles in the London *Examiner*, for which he began writing 1834. Forster succeeded Dickens for a short time as editor of the *Daily News*, and was editor of the *Examiner* ten years. He wrote many admirable biographical and historical essays, and elucidated obscure points, and corrected erroneous notions about the times and statesmen of the English Commonwealth. To that period chiefly Forster directed his studies; and no person desirous of properly understanding it, should neglect his *History of the Grand Remonstrance; Arrest of the Five Members; Sir John Eliot, a Biography;* and *Lives of the Statesmen of the Commonwealth.* His literary memoirs also are excellent. The chief are *The Life of Oliver Goldsmith* (1848); *Walter Savage Landor*, 2 vols. (1868); *The Life of Charles Dickens*, 3 vols. (1871–74); and the first vol. of a *Life of Swift* (1876). Forster's style is clear, forcible, and elegant; his treatment of subjects is pointed and outspoken. He was appointed sec. to the commissioners in lunacy 1856, and a commissioner in lunacy 1861.

FORS'TER, The Right Hon. WILLIAM EDWARD: b. Bradpole, Dorset, England, 1818, July 11; d. London, 1886, April 5. son of William Forster (1784–1854). He was educated at the Friend's School, Tottenham, and became a worsted manufacturer at Bradford. In 1846 he distributed in Ireland a famine relief fund raised by the Quakers. In 1859 he contested Leeds unsuccessfully in the Liberal interest, and 1861 was elected for Bradford. He filled the post of under sec. for the Colonies 1865, Nov. —1866, July, was vice-pres. of the committee of council on education and fourth charity commissioner, 1868–74. Mr. Forster acquired great reputation from the admirable manner in which he piloted through the house of commons the Education Bill of 1870, and the Ballot Bill of 1871. He became Irish sec. in the Liberal ministry of 1880. The extent to which outrage and intimidation prevailed in Ireland led the government to pass, in the face of the opposition of the Irish party, a Peace Preservation or Coercion Act, giving the Irish administration the power of imprisoning without trial persons reasonably suspected of crime; and on Forster was concentrated all the odium of introducing and applying this measure. When, in 1881, the leaders of the Land League were arrested, the bitterness with which 'Buckshot Forster' was denounced throughout Ireland was prodigious; though Forster deserved great credit for zeal, determination, and skill in carrying the Land Act of 1881, which conferred unparalleled privileges on the Irish tenantry. In 1882, May, the government resolved to release the chief political suspects; and Mr. Forster, disapproving this step, resigned office. Consult *Life of Forster* by Reid.

FORSTERITE, n. *fawrs'tėr-īt* [named by Levy after Mr. *Forster*, a patron of mineralogy]: an orthorhombic transparent or translucent mineral, of white, yellowish-white, yellow, gray, or greenish color, and vitreous lustre. There are two varieties, forsterite proper, from Vesuvius and boltonite, from Bolton, Mass. Some authorities make forsterite a variety of olivine.

FORSWAT, a. See FORESWART.

FORSWEAR, v. *fŏr-swär'* [AS. *forswerian*, to forswear, —from *for*, away; *swerian*, to swear]: to swear falsely; to commit perjury; to deny or renounce upon oath. FORSWEAR'ING, imp. FORSWORE, pt. *-swōr'*. FORSWORN', pp. *-swōrn'*.

FORSWONK, n. *fŏr-swunk'* [*for*, intensive, and pt. of OE. *swink*, to labor]: in *OE.*, over-labored.

FORSYTH, GEORGE ALEXANDER, American military officer, b. Muncy, Pa., 1837, Nov. 7. He served with distinction in the Civil War; was brevetted colonel for gallant services at Five Forks, and brigadier-general in 1868 for his action in an engagement with hostile Indians. He was a member of the board of officers to inspect the armies of Europe and Asia in 1875–6, and on staff and frontier service till 1890, when he was retired on reaching

the age limit. He has published: *Thrilling Days in Army Life* (1900); *The Story of the Soldier* (1900).

FORSYTH, John, American politician: b. Fredericksburg, Va., 1780; d. Washington, 1841, Oct. 21. He was graduated at Princeton College in 1799, and was admitted to the bar in Augusta, Ga., in 1802. He was elected attorney-general of the State in 1808, representative in Congress in 1812, and United States senator in 1818. In 1820, he was sent to Spain as resident minister, where he conducted the negotiations concerning the ratification and execution of the treaty by which Florida was ceded to the United States. In 1823 he was again chosen to the House of Representatives, and was one of the main supporters in Congress of Gov. Troup of Georgia in his contest with the national government concerning the removal of the Creek and Cherokee Indians. He became governor of Georgia in 1827, and in 1829 was again returned to the United States Senate. He opposed the South Carolina movement of nullification from its beginning, and voted in favor of Mr. Clay's compromise act of 1833. In the debate in 1834 on the removal of the deposits from the United States bank, he supported the President, who afterward appointed him secretary of state, an office which he retained till the retirement of President Van Buren in 1841.

FORT, n. *fōrt* [F. *fort;* It. *forte*—from L. *fortis*, strong]: a fortified place; a castle; any stronghold made secure by walls, and usually by a ditch and parapet also: see Fortification. The term has a peculiar meaning in British N. America, formerly in the unsettled territories of the United States, being applied to a trading-post in the wilderness with reference to its indispensable defenses, however slight, against the surrounding barbarism. It has thus been often employed to designate merely a palisaded log-hut, an oasis of civilization in a wilderness extending hundreds of miles in all directions. Fortalice, n. *fōrt′ăl-ĭs* [Prov. *fortalessa;* Sp. *fortalezza*—from mid. L. *fortălĭtĭă*, a small fort—from *fortis*, strong]: a small fort; a block-house for defense. Fort′let, n. a small fort. Fortress, n. *fŏrt′rĕs*, a place of defense or security; a large fort; a regularly fortified town; a castle; safety. Fort′ressed, a. *-rĕst* [F. *forteresse*]: defended by a fortress.

FORT AD′JUTANT′: staff-officer in a fortress—where the garrison is often composed of drafts from different corps—analogous to the adjutant in a regiment. He is responsible to the commandant for the internal discipline, and the appropriation of the necessary duties to particular corps.

FORTALEZA, *fawr-tâ-lā′zâ*, or Villa do Forte: city cap. of province of Ceará, Brazil; at mouth of the Ceará river, on a bay in the Atlantic; lat. 3° 42′ s., long. 38° 30′ w. It comprises an old and new town, is regularly laid out and paved, and contains the governor's palace, Rom. Cath. bishop's palace, Latin school, and hospital. It was known as Ceará prior to 1822. Pop. abt. 25,000.

FORT ANN: village of Washington co., N. Y.; on Wood Creek, the Champlain canal, and the Delaware and Hudson railroad, 60 m. n. by e. of Albany. It manufactures sashes, blinds, doors, leather, knit goods, and pulp. It has ruins of a British fort built 1709, and captured from a small Continental garrison in 1777, during the Revolution. Pop. of village 431, with township 2,263.

FORT AUGUSTUS: village at the s. end of Loch Ness, 92 m. s.w. of Inverness. A fort, intended to overawe the Highlands and having accommodation for 200-300 men, was built here soon after the rebellion of 1715, on a small eminence. It was taken by the rebels 1745, and became the headquarters of the Duke of Cumberland after Culloden. In 1867 the fort and crown property adjoining were sold to Lord Lovat, who has since converted it into a Benedictine Educational Institute.

FORT DODGE: city, cap. Webster co., Ia.; on the Des Moines river, the Ia. division of the Illinois Central R. R., the Chicago Rock Island and Pacific, and other railroads, 85 m. n.n.w. of Des Moines. It has a fine court-house, public library, municipal waterworks, and good schools including a Catholic seminary. Its agricultural, coal-mining, quarrying, and railroad interests are large, and it has railroad construction and repair shops, manufactures of brick and tile, pottery, plaster and stucco, paints, foundry products, oatmeal, etc. Pop. (1890) 4,871; (1900) 12,162.

FORT DONELSON. See Fort Henry and Fort Donelson.

FORT DUQUESNE. See Pittsburgh.

FORTE, n. *fōrt* [It. *forte*, the flower, the best]: strong point; that in which any one excels.

FORTE, ad. *fŏr'tā* [It. *forte*, very much]: in *music*, with force; loudly.

FORT EDWARD: village of Washington co., N. Y.; on the e. bank of the Hudson river and the Champlain canal, and on the Delaware and Hudson railroad at the junction of the Glens Falls Branch, 34 m. n. of Albany. It was incorporated as a village in 1849, and owns and operates its waterworks. Fort Edward Collegiate Institute is situated here. Fort Edward has saw-mills, potteries, and manufactures of iron, lumber, machinery, castings, and paper. A fort was erected here 1709, a second and larger one 1755, first named fort Lyman, then Fort Edward after Edward, Duke of York, and during the French, Indian, and revolutionary wars the place was of much importance. Pop. (1900) 5,216.

FORT ERIE, Canada, a post village in Welland County, Ontario, on Lake Erie at the head of the Niagara River, opposite Buffalo, N. Y., with which it is connected by a railroad bridge. Three railways enter the town which is a port of entry and has an American consulate. Pop.

(1900) 1,000. The present town stands upon the site of old Fort Erie which was the scene of considerable fighting during the War of 1812. On 1813, May 28, the British forces abandoned the fort and partially demolished it and during the next few months, with the varying fortunes of war, it was held alternately by the American and British forces. Early in 1814, July, Major-General Jacob Brown (q.v.) with 5,000 troops backed by 4,000 New York militia, which had been ordered out and authorized for the war, invaded Upper Canada from Buffalo and one of his first objects of attack was Fort Erie which surrendered to him on July 3. Two days later at Chippewa he successfully attacked General Riall with a loss of 511 men killed and wounded. After the bloody battle of Lundy's Lane (q.v.), on July 25, fought between the American Generals Brown and Winfield Scott and the Canadian General Sir Gordon Drummond (q.v.), the American forces, numbering about 2,000 men, under command of General Ripley (both Brown and Scott having been wounded), were forced to return to the fort, having suffered a loss of 743 men as against a British loss of 878. The American forces were shortly afterward (August 7–14) unsuccessfully attacked by Drummond, who, after an almost constant bombardment during the seven days, retired with a loss of 500 men. Brown was, however, blockaded within the walls of the fort until September. The fort remained in possession of the Americans till November 5, when, upon retiring from Canada, they blew up the fortifications and they were never subsequently rebuilt.

FORTESCUE, *fawr'tės-kū*, Chichester Samuel Parkinson (Lord Carlingford): Irish statesman: b. 1823, Jan. 18; d. 1898, Jan. 30. He was educated at Eton and at Christ Church, Oxford; obtained a first-class in classical honors and the chancellor's prize for a historical essay, 1846: represented the co. of Louth, Ireland, in parliament 1847–74; was a lord of the treas. 1854–5: under-sec. of state for the colonies 1857–8, 1859–65; was sworn a privy councilor 1864; was appointed chief sec. for Ireland 1865, Nov. 20 and 1868, Dec.; became pres. of the London Board of Trade 1870; and at the request of Mr. Gladstone was raised to the peerage as Baron Carlingford 1874, Feb. In 1881, April, he succeeded the Duke of Argyll as lord privy-seal; 1882, Feb. was created a knight of the order of St. Patrick; and 1883, March 17, succeeded Earl Spencer as lord pres. of the privy council.

FORTESCUE, Sir John: eminent judge and writer on English law: b. in the reign of Henry IV.; d. in his 90th year (exact date unknown); son of Sir Henry Fortescue, Lord Chief Justice of Ireland; of an ancient Devonshire family. Educated at Exeter College, Oxford, he was called to the bar at Lincoln's Inn, and 1441 was made serjeant-at-law. The following year he was appointed lord chief justice of the court of king's bench. In the struggle for the crown between the Houses of York and Lancaster, he steadily adhered to the latter, and is sup-

posed to have been for a time lord high chancellor of England. Lord Campbell, in his *Lives of the Lord Chancellors* (I. 367), under date, 1461, Feb. 17, says: 'If Sir John Fortescue ever was *de facto* chancellor, and in the exercise of the duties of the office, it must have been now, after the second battle of St. Albans, and at the very conclusion of the reign of Henry VI.' In March of that year, he fought at the battle of Towton for that monarch, and was attainted by the parliament under Edward IV. He accompanied the queen, Margaret of Anjou, and her young son, Prince Edward, on their flight into Scotland, and while there wrote a treatise in support of the claim of the House of Lancaster to the English crown. In 1463, he embarked with the queen and her son for Holland, where he remained several years, intrusted with the education of the young prince. During his exile he wrote his celebrated work, *De Laudibus Legum Angliæ*, for the instruction of his royal pupil. In the introduction, and throughout the dialogue, he designates himself 'Cancellarius.' It was when he was in Scotland that the title of Chancellor of England is said by some to have been conferred on him by the dethroned monarch. He probably had the titular of chancellor *in partibus* during his exile, but never exercised the functions in England. In 1471, he returned with Queen Margaret and her son; but on the final defeat of the Lancastrian party at the battle of Tewkesbury, where he is said to have been taken prisoner, finding that parliament and the nation had recognized the title of Edward IV., he submitted to that monarch, and, as a condition of his pardon, wrote a treatise in favor of the claim of the House of York. He was allowed to retire to his seat at Ebrington, in Gloucestershire, where he died. His male representative was, in 1789, created Earl Fortescue and Viscount Ebrington in the peerage of Great Britain.

FORT GARRY, *fōrt găr'rĭ:* Hudson's Bay Company's station, beside which has sprung up the thriving town of Winnipeg (q.v.), cap. of the province of Manitoba, Dominion of Canada.

FORT GEORGE (India). See Madras.

FORT GEORGE, Canada, a former fort on the Canadian side of the Niagara River. On 1813, May 27, it was captured by the American forces under Col. Winfield Scott. On 1813, Dec. 10, the fort was evacuated by Gen. McClure. See Fort George, Battle of.

FORT GEORGE, Battle of, 1813, May 27, in the War of 1812. The fort was near the mouth of the Niagara River, on the Canada side, nearly opposite Fort Niagara, and was garrisoned by about a thousand British regulars and several hundred militia under Gen. Vincent. The American force of some 4,000 undertook to take it in rear and capture the garrison; the nominal commander was Morgan Lewis, the real one Winfield Scott. The forces were landed from the fleet, nominal commander Chauncey, real one Oliver Hazard Perry, and a joint attack was made.

The fleet enfiladed the beach; Scott advanced along the shore, and made a flanking movement. Vincent evacuated the fort, spiked the guns, and slowly retreated, parallel to the river, beyond Queenston Mt., losing 51 killed and 305 wounded and missing, from his regulars, while most of the militia were captured. American loss, 40 killed, 120 wounded. The other forts on the river were soon abandoned by the British.

FORT GRISWOLD, *griz'wold*, MASSACRE OF, 1781, Sept. 6. Hearing of Washington's southern march, Sir Henry Clinton, as the only available diversion, sent an expedition against New London, Conn., where a quantity of stores were collected, with slight defense from Fort Trummbull on the New London side and Fort Griswold on the Groton side of the Thames, and which was a nest of privateers that had greatly annoyed the British. Benedict Arnold was selected to head it, as a Connecticut man; an ugly method of making him seal his new allegiance. On taking possession of Fort Trumbull, it became evident that the American shipping would escape unless Fort Griswold were captured also; it was reported unfinished and occupied only by 20 or 30 men, and he ordered an attack on it. Shortly seeing that it was stronger than he supposed, and garrisoned by those who had escaped from Fort Trumbull, and that the ships were escaping up the river, he countermanded the order, but too late. The British detachment of 600 regulars had assailed the fort, where 157 militia had gathered; and after 40 minutes' assault, with the loss of 192 men, the British carried it, and despite the appeals for quarter, massacred nearly the whole garrison. Col. Ledyard, the commander, and 70 others were killed, 60 wounded, 35 mortally, and only 26 escaped unhurt. The British officers, however, did their best to stop the slaughter, and the atrocious story formerly told of the murder of the colonel is fiction. The massacre of garrisons *in terrorem*, to teach them not to defend untenable places, was justified by the European rules of war at the time, but had not been practised in America. Even American officers, however, spoke of it at the time as a regrettable but almost inevitable incident of war.

FORTH, ad. *fōrth* [AS. *forth*, forward: Dut. *voord*, forwards: Ger. *fort*, on further]: forward in place or order; in advance from a given point; onward in time; out; abroad; in *OE.*, thoroughly; from beginning to end. FORTH'COMING, a. about or ready to appear; in the *law of Scotland*, an action by which an arrestment (q.v.) is made available to the arrester—bringing the debtor before the judge that legal decision may issue. FORTH'GOING, n. a going forth; a proceeding from: ADJ. going forth. AND SO FORTH, and other things that might be mentioned.

FORTH: river of Scotland, rising in the n.w. of Sterlingshire, in the mountains between Loch Katrine and Loch Lomond, from two main branches, the Duchray (16 m. long), from the e. side of Ben Lomond, and the Avend-

hu (12 m. long), flowing through Locks Chon, Dhu, and Ard. These streams unite at Aberfoyle, and issue from the mountains. The Forth then runs e. and s.e. along the borders of Perth and Stirling shires, with numerous windings, in a wide valley abounding in picturesque scenery. It passes Stirling, and a little above Alloa it widens out into the Firth of Forth. The Forth is only 30 m. long in a straight line from its source to the mouth of the Devon; but, owing to its sinuosities, its real course is more than twice that length. It is navigable for vessels of 100 tons to Stirling. Its chief tributaries are the Teith, the Allan and the Devon.

FORTH, FIRTH OF: arm of the sea, on the e. coast of Scotland, or the estuary of the river Forth: between Clackmannan, Perth, and Fife on the north, and Stirling and the Lothians on the south. It first extends six m. s.e. from where the Devon joins the Forth; then with an average breadth of 2½ m. its course is 10 m. to Queensferry: and finally it extends 36 m. n.e., gradually expanding in width to 15 m. between Fife-Ness and Tantallon Castle on the coast of Haddingtonshire. In 1882–88, a railway bridge was built across the estuary at Queensferry; and at Alloa also a bridge was opened 1885. In 1883–90 the Forth Bridge, a remarkable feat in engineering, was constructed at a cost of $16,000,000. The waters of the Firth are from 7 to 30 fathoms deep and encircle the Isle of May, Bass Rock, Inchkeith (fortified 1881), Inchcolm, Cramond Isle, etc. On the coast are many fine harbors. St. Margaret's Hope, above Queensferry, is one of the safest roadsteads in the kingdom. The chief rivers which fall into the firth are the Forth, Carron, Avon, Almond, Esk, and Leven. The counties along its shore are the most fertile and best cultivated in Scotland, and include the maritime towns of North Berwick, Leith, etc.

FORT HENRY AND FORT DONELSON. Two forts erected by the Confederates early in the civil war to control the navigation of the Tennessee and Cumberland rivers. Fort Henry was on the right bank of the Tennessee and Fort Donelson on the left bank of the Cumberland. They were about 12 miles apart and both in Tennessee near the boundary line between it and Kentucky. 1862, Feb. 2, a combined land and naval force, under Gen. Grant and Commodore A. H. Foote left Cairo, proceeded up the Tennessee, and on the 6th the navy attacked Fort Henry, defended by 17 heavy guns, manned by about 100 artillerists. After a little more than an hour's heavy bombardment Gen. Lloyd Tilghman, in command, surrendered himself, the fort, and 78 men. He lost 18 killed and wounded: Foote's loss was 29 killed and wounded. The 3,000 Confederates who had held the trenches surrounding the fort on the land side, escaped to Fort Donelson, Gen. Grant, who had landed 6 miles below the fort, arriving too late to intercept them. On the 12th Gen. Grant with about 16,000 men, marched upon Fort Donelson, which was held by about 18,000 men, under Gen. J. B. Floyd, and

invested the place. He opened the attack on the 13th by a furious cannonade and some sharp skirmishing, and next day the fleet, that had gone from the Tennessee to the Cumberland, joined in the attack, but was soon disabled and withdrew, after the loss of 54 men killed and wounded. During the day Grant was joined by 10,000 men, raising his force to about 26,000 men. At sunrise of the 15th the Confederates endeavored to cut their way out and at first met with some success, turning Grant's right and opening a road to escape, but Grant renewed the fight, regained part of the lost ground, ordered a general advance, and driving the Confederates back within their own works, succeeded in gaining commanding parts of them. The fighting during the day was severe. During the night Col. N. B. Forrest with about 500 cavalry, cut his way out by the river road, and Gens. Floyd and Pillow, with about 1,200 men, abandoned their commands and escaped on steamboats, leaving the fort and garrison in command of Gen. Buckner. On the morning of the 16th Buckner recognising the hopelessness of his position proposed to Grant an armistice until noon, and the appointment of a commission to consider terms of surrender; to which Grant replied: 'No terms except unconditional and immediate surrender can be accepted. I propose to move immediately upon your works.' Buckner at once surrendered the fort with 14,500 men, 57 guns, and a great quantity of ammunition and stores. The Union loss, army and navy, was 510 killed, 2,152 wounded, and 224 missing. The Confederate loss, killed and wounded, was about 2,000. The capture of Forts Henry and Donelson, caused the abandonment by the Confederates of Columbus, on the Mississippi, Bowling Green and Nashville.

FORTHINK, v. *fŏr-thĭnk'* [*for*, and *think*]: in *OE.*, to be sorry for; to repent of.

FORTHRIGHT, ad. *fōrth-rīt'* [*forth*, and *right*]: in *OE.*, straight forward: N. a straight road or path.

FORTHWITH, ad. *fōrth-wĭth'* [*forth*, and *with*]: without delay; immediately.

FORTHY, ad. *fŏr-thī'* [AS. *forthi*, therefore—from *for*, and neut. form *thy*, with the]: in *OE.*, therefore; wherefore.

FORTIETH, a. See under FORTY.

FORTIFICATION: literally the 'making strong' of any place whatever, be it town, arsenal, camp, house, or the extended position of an army occupying a tract of country, a province, or even a kingdom. In common usage, the term is limited to strengthening by means of walls, ditches, or other stationary obstructions, aided more or less by artillery, which may impede hostile advance. The art of fortification is usually divided into two branches—permanent, and field or temporary fortifications. The former are constructed of durable materials to defend a position of permanent importance; the latter, serving only a tem-

porary purpose, are constructed of materials most convenient and most easily convertible to the purposes desired. Fortification cannot pretend to render strongholds impregnable, for no works, however skilfully devised, will withstand the continued fire of well-directed artillery, backed by energy and discretion on the part of assailants: its aim is to enable a beleaguered garrison to hold out, without losing ground, until it can be relieved by the advance of allies operating in the field. Impregnable fortresses no longer exist. All along the trend of history the term has been fanciful and merely relative. Even Gibraltar, as an isolated fortress, aside from its political and moral force, has its military value as a well located rendezvous for troops and shipping, and the theoretical guardian of the passage from the Atlantic to the Mediterranean Sea. Of this passage, it has no supreme control, without a sufficient naval contingent. In all other respects, it simply defends itself, with no interior at its back, and when without control of the sea, by fleets, imprisons a valuable garrison. In modern times the stationary must yield to the mobile. The art of destruction is more potent and far-reaching than the skill of man to preserve his own workmanship.

Military Conditions.—The fundamental principle in all substantial fortifications has been the effort to ensure a destructive fire upon every available avenue of approach to the place protected, and, with this, to secure such enfilading and cross-fire that no position remained unprotected. Human competition has ever been the same in essence, and where no reliable historic record responds to inquiry, exhumed ruins, memorial tablets, and deciphered hieroglyphics, solve all doubt as to the proposition that military science and military engineering belonged to all human activity, ever the same in principle, and differing only in application and development. The paramount object was, to eliminate disparity in physical strength and enable the few to resist the many. Personal combat at short range came to a limit as people gathered in cities; and breastworks first, and then solid walls, became essential in proportion as the numbers of non-combatants gathered there for shelter and safety.

Ancient Types.—The most primitive forms of which the earth retains an outline were oval, or circular, mounds or entrenchments, even before walled towns were constructed, these being more compact for defense of each front, or exposure, by defenders from the centre. More modern defenses, especially against savages, of the block-house type, had this peculiar value, and even women could prepare arrows, or load weapons, for defenders who in turn acted in all directions.

Such defenses were upon commanding positions, to guard against surprise, with wood and water always within easy reach. These were transient, and usually against predatory or nomadic peoples, of no greatly superior strength.

FORTIFICATION.

As populous centers increased, defenses were of stone or brick walls of such height and breadth that large armies could mount their summits and chariots convey men and munitions from one point of defense to another. These were surrounded by a flooded moat, or ditch, and were easily made impregnable against an army of equal force and equipment. Towers at angles of quadrangular defenses, and to protect gates of entrance, exit, or for sallies upon an enemy, were supplied with lifting or draw bridges, and mines and tunnels were excavated under the ditch itself for more ready surprise of a careless adversary. Cæsar describes a mine which he advanced beneath both ditch and wall, supporting the wall with timber until he could fill the shaft with dry branches, and upon setting all on fire, the wall crumbled, and he stormed the breach.

Great machines were made by which to reach engirdling camps, or crush assailants who attempted to bridge, or fill the ditch, and thus gain access to the wall summit by scaling ladders, when unable to force the gates. The catapult and ballista were two of these, which, on the principle of the spring-board and sling, and the increased length of its vibrating arm, the radius of its centrifugal force, would hurl heavy stones at a great distance and send blazing balls of tallow, or pitch, congreve-rocket-like, to destroy a hostile camp.

To meet these mighty forces, corresponding engines of swinging, battering timbers, called 'rams' from the device curiously shaped in front, would strike a blow equal to the force of a 30-pound shot, powder-driven. Movable towers, protected by wet hides from fire, were advanced, putting its archers upon a level with those upon the city wall. Titus, at the siege of Jerusalem, brought such towers sufficiently near that, with grouped lances and timbers, he bridged the intervening distance and fought on the city wall itself.

With the increase of territorial domain, subordinate but correlated military engineering had its special province. Territorial boundaries, mountain passes, sharp defiles, river fords, and watercourses, had to be guarded by detached outworks, and these must have close relation, each to the next in order. Swamps, impervious to mounted or heavily armored men, were utilized, and their narrow approaches, or shallow portions, were so fashioned and guarded as to keep assailants from fire-range upon defenders. Outlying summits were made signal stations, both against herds of wild beasts, which in early times were as dangerous to flocks and herds as robbers or hostile invaders were to the inhabitants themselves. Bonfires and flaming torches, as well as a chain of vocal and flag-shaking sentries, became adjuncts to a better external defense. Cæsar had 'soldiers who shouted to each other until the alarm reached his camp,'through a great distance.' The ancient Persians, and later the Scotch and Swiss, were noted for this signal service.

Methods of Construction.—In fortifying a place, the engineer usually proceeds upon some defined system of entourage; but if he hope for success, his science must be sufficiently elastic to adapt itself to all the natural features of the locality; and from this it follows that a system perfect in theory, and of universal application, will in practice have to undergo modifications, differing in almost every instance.

The prime element of all fortification is the parapet (from Italian *para*, before; *petto*, the breast), which may be a wooden stockade, a wall of masonry, or a mound of earth, and is intended to give more or less cover to the defender from the projectiles of his adversary, while he is still able to use his own weapons against the latter. The simplest form of parapet being the mound of earth, the ground adjoining it would probably be dug up for its formation, and from this would naturally ensue the ditch, as an additional means of separating the assailant and the assailed. Starting, then, from this parapet and ditch or fosse, as the elementary forms of defense, the following are concise, practical definitions of the parts, adjuncts, and technical names of a fortification.

The first duty of a defender is to prevent the enemy's near approach to any of his works. In developed systems, this is sought to be done by bastions, etc., which stand out at angles to the general line, so as to afford a fire commanding all parts. But as cases occasionally happen of troops, defended by a mere straight parapet and ditch, having to withstand the advance of the enemy it is necessary to adopt every measure which can obstruct his path, harass his advance, and, if possible, aid in cutting off his retreat in the event of failure.

Abattis (q.v.) consist of trees cut down, shorn of their leaves and smaller twigs, having their branches pointed and then laid close together, in one or more lines parallel to the works, branches outward, and trunks imbedded or pinned down in the earth. Accoutred troops must remove these before they can pass, and the operation of removal under fire from the besieged is very serious. *Chevaux-de-frise* are pointed iron or wooden rods fixed crosswise in a wooden beam, and until removed offer a complete obstacle to progress. They are very useful in a breach or other unclosed portion of a work. *Chaussetrapes*, or *Caltrops* (see CALTROP), give serious annoyance to troops advancing and are especially dangerous in cases of night-attack. *Trous-de-loup* (wolf-traps), deep holes dug, and armed at the bottom with spikes, young trees cut down and their stumps pointed, inverted harrows, broken sword-blades, bayonets, or any similar annoyances, are resorted to as expedients to gain time, and thereby insure a more deadly fire on the assailants. *Fraises and Stockades* represent another form of additional defense, and are stout posts driven horizontally or perpendicularly into the earth, in long close rows. The stockade forms at times, a good substitute for the parapet itself, particularly when the direct fire of artillery is unlikely to be brought against it

as in warfare with barbarous tribes, or in a work at the very crest of a steep hill.

Construction of the Parapet.—The object of the parapet being to defend, or *defilade* a certain portion of ground behind it, its height must be calculated so that missiles passing across its crest shall fail to strike the troops mustered behind. The minimum width defiladed to allow of safe communication for troops behind, and actually defending, is 30 ft.; but if the men have to be drawn up in line not less than 90 ft. will suffice. It is disadvantageous to construct a parapet within range of higher ground, as for every extra foot of elevation in the commanding rise a proportionate addition must be made to the height of the parapet. In practice, the ordinary parapet for a level is eight ft. high, which allows for the depressed trajectory of a spending ball: see PROJECTILES. If the parapet be raised on ground above the attacking position, it may be lowered, according to the angle, to above six ft. six inches, the height necessary for a man standing up to be thoroughly protected. On the other hand, if the position be lower than the point occupied by the assailant, the parapet must be raised; as 12 ft. forms the limit to which a parapet can conveniently be thrown up, further height necessary for protection is obtained by sinking the ground to be defiladed before the parapet's base.

The foregoing parapet has been provided only as a straight breastwork, deriving its safety solely from its own fire in a direct line upon the besiegers; but in practice such a rampart would be exposed to the disadvantage of holding but little command over the *scarp* or *escarp* (part cut away) at its foot; so that, if approached under cover, an enemy could readily lodge himself therein. To guard against this a work is *flanked*, so that the fire of one part shall take in flank an enemy advancing against another part. The flanked parapet has often the power of defilading larger spaces than the simple line of parapet, since the salient angles can, perhaps, be brought on elevated ground; while the re-entering angles, though with less elevation, may in some degree compensate that defect by greater distance from the front. A disadvantage of flanked defenses is, that the hostile fire crosses the parapet at a less angle than in the straight line, and may, therefore, be more deadly; indeed, the object of the assailant will always be to obtain an enfilade fire *along* one or more parapets of the defense. To avoid this, the engineer must make his salients at such angles that the prolongation of his parapets toward the enemy shall always fall on low ground, whence no command can be obtained. Where the salient angle becomes somewhat acute, and there is an enemy on both fronts, the soldiers defending the right parapet, and standing on its banquette, would be exposed to a *reverse* or back fire from the enemy in front of the left parapet, beyond the defilading of which they would doubtless be. As a remedy, an internal parapet, called a *traverse*, or, from its duty. a *parados*,

is raised between the parapets of the salient, its height being determined on precisely the same principles as were made use of in regard to the original parapets. Where both the faces of the salient are unavoidably so placed as to be enfiladed, a small work, called a *bonnet*, is constructed at the angle, which consists in the parapet being so raised up to an extra height of 12 ft. if necessary, and at the same time widened, that the banquette shall be defiladed. If a height of 12 ft. be insufficient to defilade the whole length of the banquette, traversing parapets must be raised at right angles to the face of the work, and within it, at such distances that the whole may be safe. The increased height of the parapet of the bonnet renders it necessary to have two or more banquettes at that portion of the work, with steps to aid the ascent.

In inclosed works—i.e., in works entirely surrounded by parapets—the position of the parados is of vital importance; and often it needs to be devised with great ingenuity to protect the defenders from reverse fire in any direction, and at the same time not to prevent necessary communication between different portions of the fortress.

Relief means the height of any point in a work above the plane of construction, which may be the line of sight or the bottom of the ditch. In the latter case, the relief of the parapet is an important item in estimating the resisting power of a work, as it represents the vertical equivalent of the obstacle which will be offered to a foe.

When the relief of the parapet's crest has been determined, its thickness becomes the next consideration. The dimensions are laid down on the ground, and depend, first, on the angle at which the material to be used will pile; and then, on the nature of the missiles against which the parapet is to afford protection. For example, an earthwork of from three to four ft. suffices to resist musketry; a thickness of 18 ft. is impervious to the 24 pounder; while larger guns can pound through even more solid obstructions.

Taking Fig. 1 as an example, in which *a* is the crest of the parapet, then the banquette *c* should, for convenient firing, be four ft. three inches below *a;* three ft. wide for a single line of soldiers; four ft. six inches for a double rank; its slope should be one in twelve, that water may run freely off. The base, *be*, of the slope up which the men mount to the banquette, should be twice its height *bc*, and cut into steps with inclined sides, to allow of easy ascent; and where the height is considerable, a supplemental banquette (on which relieving men can, if necessary, reload), is desirable. The interior slope, *ac*, of the parapet should be one in four; the exterior slope, or *plongée*, *ad*, intended for the direction of the guns on an assailant, one in six, a deviation being permitted between one in nine and one in four; but the crest being more liable to destruction as the slope of *ab* is augmented, it is best to keep it as small as circumstances will allow; one in six is a

usual ordinary slope the angle of the interior slope being constant. In some European continental services, however, the angle, *cad*, is kept constant at 100°, by increasing the deviation of the interior slope of the parapet from the perpendicular as the plunge of the exterior is greater. The flatter, however, the crest of the parapet is, the better, as sand-bags are in certain cases ranged on it to form cover for the men, while they fire through loop-holes left in this additional defense. Earth of medium tenacity maintains its position properly when sloped at an angle of 45°; and this is the greatest angle which can be counted on for the outer slope of the parapet. The scarp, *l*, and counterscarp, *m*, of the ditch need not have so great an incline. In such cases, the base of the triangle is frequently made equal to half the perpendicular.

In Fig. 1, *ghi*, is the *glacis*, formed during the excavation of the ditch, and having for object the bringing of an advancing enemy into the best line of fire from the parapet. The base and perpendicular of its interior slope, *gh*, should be equal; the slope of the outer face should be one in twelve, unless the slope of the ground render some different angle desirable. An advanced glacis, *k* in Fig. 1

Fig. 1.—Section of Parapet, Ditch, and Glacis.

is sometimes adopted, in order that the enemy may sooner be brought under fire. It is absolutely necessary that the crest of the parapet should be five and a half ft. higher than the crest of the glacis, as, otherwise, an assailant having reached the latter, would be able to pour a musketry-fire over the former into the work. No part of any glacis, whether near or advanced, should be more than two feet below the line of fire from the parapet—i.e., the line joining the crests of the parapet and glacis continued; if more depth be allowed, the enemy may advance in a crouching posture, without being liable to be hit. Advanced glacis are usually made of earth thrown up in prolonging beneath the ground the plane of the preceding glacis. They may be defended entirely from the parapet, in which case palisades or abattis are often fixed (as in Fig. 1) to delay the advancing enemy when at the point of greatest exposure. On the other hand, these advanced glacis are occasionally defended as a series of advanced intrenchments, and only abandoned one by one, as the defenders are driven in toward their main work.

The dimension of the ditch depend in some measure on the amount of earth required for the parapet and glacis; but in addition to being the mine whence the materials for the latter works are drawn, the ditch must also oppose a considerable obstacle to any hostile advance. To do

this effectually, the minimum width across the top is 18 ft., its depth is usually from 8 to 12 ft.

The *scarp,* or inner face of the ditch, is most difficult of ascent by the assailant, when in a continuous line with the parapet, but sometimes it would be dangerous to construct the work with this continuity, as damage to the scarp would jeopardize the stability of the parapet. In these cases a narrow step, called a *Berm* (q.v.) of from two to four ft. is made to intervene between the foot of the parapet and top of the scarp: as a precaution, it is covered with all possible obstacles to any lodgment being effected on it by the enemy. When a berm is employed, greater steepness is usually given to the scarp. The *counterscarp,* or outer sloping side of the ditch, should be somewhat steeper than the scarp. The bottom of the ditch should slope from both sides towards the center, to carry off the water; and obstacles should be scattered about to prevent an enemy from forming his troops in the ditch.

Earthworks in Field Fortification.—As the most readily constructed, earthworks naturally recommend themselves to the engineer, who, in the field, is called to defend the position of an army against sudden attack. Their utility has been shown in their employment from earliest times; and modern experience tends to prove that earth parapets are, of all fortifications among the most difficult to overcome. An army maneuvering before a superior force, can scarcely hope to avoid battle being thrust upon it, unless, strengthened by fieldworks, it be rendered more nearly equal to the adversary. Napoleon, Marlborough, Eugène, Wellington, have given their names as witnesses to the indispensability of such works. The Russian parapets at Borodino made the French victory so sanguinary that it was useless to the victors. A few redoubts at Pultowa saved Peter the Great from total defeat by his formidable Swedish rival. The world-famed lines of Torres Vedras enabled Wellington with 50,000 troops, half of whom were untried Portuguese, to withstand for five months, and ultimately to drive back, the hitherto victorious army of 70,000 French, under such commanders as Masséna, Ney, and Junot. The earthworks surrounding Sevastopol partook greatly of the nature of fieldworks for the protection of a large army, and history will not forget to recount the resistance they offered for almost a year to troops equal to any in the world. Two illustrations from the Civil War are suggestive of their value:

On 1862, April 5, when both officers and men were alike inexperienced in operations of war, between large armies and over extended territory, remote from their general base, the Federal army was confronted at Pittsburg Landing, Tenn., by a largely superior force under command of Gen. Albert Sydney Johnston, of the Confederate army. Skirmishing occurred during the day; but Gen. Grant, the chief Federal commander, believing, as he advised his superior, Gen. Halleck, and states in his

Memoirs, that there was hardly the slightest possibility of attack, as reinforcements were on the way to his support, failed to entrench. On the following morning, an attack was made in force, driving the Federal army back to the Tennessee River, where the arrival of Gen. Buell's division alone averted a serious disaster. Neither Gen. Grant nor Gen. Sherman committed a similar error of judgment later in the war.

On 1864, Nov. 30, Major-Gen. John M. Schofield retired from Pulaski, closely followed by the two-fold superior army of Gen. Hood. After fighting daily for three weeks, and after frequent rains, leaving with night he marched directly to the city of Franklin, Tenn., where in the bend of the Harpeth River, he gave battle. Between morning and three o'clock of that afternoon, when the combined Confederate divisions made an impetuous assault, his wearied soldiers had so utilized the shovel, pick, fence rails, locust trees, and osage-orange hedges that, behind their shelter, he repulsed the assault, inflicting a loss of nearly 7,000 men upon his adversary, including 12 general officers, in killed, wounded and captured, and safely fell back upon Gen. Thomas, at Nashville, with a loss of but 20 wagons and less than half the casualties of his opponent.

For a line of works whether of earth or masonry, to be efficient, it must combine artillery fire with that of musketry. The guns will generally be so placed as to command some specific line of approach, such as a ravine, a line of abattis, or some portion of the glacis. They should themselves be as little exposed as possible, nor should the gunners be uncovered more than is absolutely requisite. To effect this, the gun is generally made to fire through an *embrasure* (q.v.) in the parapet, instead of over the latter. The embrasure is a cutting through the solid parapet, 20 inches wide at its inner extremity, and outward half as much as the width of the parapet. In cases where it is necessary, for proper command, that the line of fire should not be lower than the top of the parapet, the embrasure is made through an additional parapet—raised, as in the previous case of the bonnet, above the original one. The bottom of the embrasure is called the *sole*, and slopes downward sufficiently to allow of a certain depression being given to the gun. The remainder of a parapet below the sole is the *genouillère* (from *genou*, a knee), and in field fortification should be three and a half ft. high; the portion between two embrasures is the *merlin* (Ital. *merlone*, battlement): and an embrasure need not cut the parapet perpendicularly, an angle being admissible, when an oblique fire is necessary. When, however, the obliquity would exceed 70°, it is usual, in order that the thickness of the parapet should not be too much diminished, to form a projecting angle in it, through which the embrasure is cut. The sides of the embrasures are *cheeks*, and require reveting.

A *barbette* is a platform raised behind a parapet, higner than the general interior with a view to guns being fired from it over the parapet.

FORTIFICATION.

There are certain fixed rules in all fortification, such as: 1. The length of lines must never exceed musketry range, or the flanking-works would become ineffective for their object. 2. The angles of defense should be about right angles. 3. Salient angles should be as obtuse as possible. 4. Ditches should have the best possible flanking. 5. The relief of the flanking-works must be determined by the length of the lines of defense. 6. The value of almost every detached work depends on the support it can give to or receive from an army or other work or works. 7. The reduction of every fortified work is merely a question of time: and a work fairly surrounded is sure to fall, unless relieved from without.

Fieldworks, which, it must be borne in mind, are intended merely to support or strengthen an army, may either have a complete circuit of parapets, or be open at the gorge in the rear. The latter are, of course, the simplest; but they are available only in positions which the enemy cannot turn, or where protected by the sweeping fire of other works behind. Of this class the *Redan* constructed of two parapets of earth and built so as to form a mere salient angle with the apex pointing toward the enemy, is the simplest and the representative form. Of the closed forts, there are *Redoubts* usually square; *Star-forts* now considered objectionable; bastioned forts, which flank their own ditches almost perfectly, while scarcely susceptible of being flanked themselves. To understand the nature of a single bastion, see A (Fig. 2), which represents one at the corner of a square work; *ab* is the left *flank, bc* the left *face, cd* the right *face, de* the right *flank; ae* is the *gorge; af, fe* are the *demi-gorges,* being continuations of the sides, or curtains, of the work; *a* and *e* are the left and right *curtain angles; b* and *d,* the left and right *shoulder angles,* and *c* is the *flanked angle.*

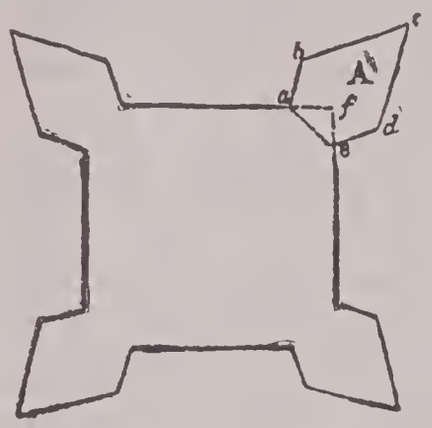


Fig. 2.—Bastioned Fort.

Continued Lines are simple parapets, either connecting fortified posts, or covering the front or flank of an army. Redans joined by curtains are those most easily constructed; but as the ditches can be defended by only an oblique fire, the curtains are occasionally so broken as to form nearly right angles with the faces of the redan, as in the dotted line; they then become *lines of tenailles.*

Lines en Crémaillière have long faces with perpendicular flanks. *Lines with intervals* are often as effective as continued lines. They consist of detached works, in two lines, within musketry fire of each other. The re-entering angle should as nearly as practicable be a right angle. The celebrated lines of Torres Vedras, before adverted to

consisted of 150 detached forts. *Tête-du-pont*, is a work to cover the approaches to a bridge; see BRIDGEHEAD. A *tenaille* is the reverse of a redan, and consists of two faces forming a re-entering angle: it can be used only in connection with some other work. A *flèche* is a breast-work of two faces, forming a salient angle, constructed on the exterior of a glacis, usually at its foot, in order to defend the ground before a bastion or ravelin.

Turning from the principal forms of elemental works of fortification, to the permanent systems into which these have been incorporated for the defense of fortresses, towns, etc., we may first notice that a *rampart* is a raised structure of earth or stone, above the mean level of the country, on which the parapets, etc., can be thrown up, and which affords to the town or space protected the extra cover of its height, while it elevates the inner works sufficiently to enable them to command and fire over those situated exteriorly to themselves. A line which can be made of earth may equally be constructed of any other material which circumstances may render desirable, the maximum resistance and minimum liability to splinter being the qualities chiefly to be considered.

Systematic Fortification for Permanent Works. The art of defense has always made equal progress with that of attack; and, early in the 15th, perhaps late in the 14th c., the Italians had commenced to flank their walls with small bastions. The bastions at Verona, built by Michiel 1523, are usually deemed as the oldest extant specimen of modern fortification. Tartagalia and Albert Dürer, painter and engineer, were early in the field. In most of the earlier systems the face of the bastion was perpendicular to its flank. The first principles were successfully improved by Marchi, an Italian (d. 1599), by Errard Bois-le-Duc, and De Ville, under Henry IV. and Louis XIII. of France. The Count de Pagan, whose treatise appeared 1645, did much toward rectifying previous errors, and laid the basement of that science which Vauban subsequently wrought almost to perfection. Vauban (b. 1633) had a genius which penetrated in every direction, equally in the ways of war and in those of peace. He might possibly have taught how fortresses could be rendered impregnable, had not the restless ambition of his master, Louis XIV., led him to demonstrate, first, that the reduction of any work was a mere question of time and powder. His talent so improved the system of attack, that even he himself could not construct a rampart that should withstand the fire conjured up against it by his discoveries. He constructed 33 new fortresses, improved above 100, and conducted personally more than 50 sieges. To him are soldiers indebted for the sweeping fire of ricochet, and to him in a degree for the traverses which endeavor to render it harmless. Coehoorn, director-gen. of the fortresses of the United Provinces, was the contemporary, rival, and opponent of Vauban; his masterpiece is Bergen-op-Zoom. Cormontaigne, Belidor, Montalembert,

Bousmard and Carnot may also be mentioned as conspicuous masters in the science.

Irrespective of irregularities in the form of the place to be defended, a particular polygon is selected as that on which the lines of defense are to be drawn. Each side of this is a *face of defense*, and the length of a side is rarely made greater than 360 yards.

Vauban's first system is shown in Fig. 3 as regards the outline of its ground-plan; Fig. 4 displaying the same in profile.

In this instance, the polygon taken is an octagon. Let *ab* (Fig. 3) be a side of this polygon: bisect this in *c*, and draw a perpendicular to *ab*. On this, inward, mark off *cC* one-sixth of *ab;* join *aC*, *bC*, and produce the lines; then from *a* and *b* respectively mark off *ad*, *bg*, each equal to $\frac{2}{7}$ *ab* for the faces of the bastions. Next, from *a* and *b* as centres, with radius, *ag*, describe arcs cutting *aC*, *bC*, produced in *f* and *e*: join *de*, *fg*, for the flanks of bastions, and *ef* for the curtain of the work. The first line of defense is then complete, the necessary parapets, etc., being of course raised on the site laid out. From an

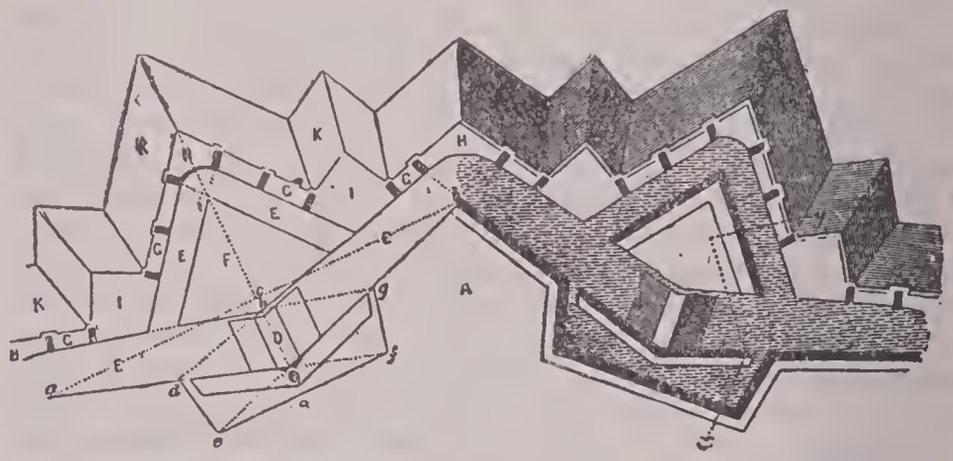


Fig. 3.—Vauban's First System; Ground-plan:
A, bastion; B, curtain; C, tenaille; D, caponnière; E, ditch; F, ravelin; G, covert way; H, salient place of arms; I, re-entering place of arms; K, glacis.

examination of this it will be seen that the whole space in the front is covered. The faces of the bastions and the curtain command more or less the entire front, while the bastion flanks sweep along the faces of adjoining bastions and along the curtain. In front, however, of the apex of each bastion, the line of advance is covered by only an extremely oblique fire. To obviate this, a ravelin, *F*, is constructed on the further side of the main ditch, which commands the doubtful fronts, and, at the same time, forms an outwork capable of assisting in the general scheme of defense. To trace the main ditch, describe from the flanked angle of the bastion, *a*, or *b*, an arc with radius 30 yds. (if dry ditch, 36 if wet), and from these arcs draw tangents to the shoulders, *d* and *g* of the opposite bastions. These tangents, meeting in the line *cC*, form the counterscarp line of the main ditch. From *h*, the re-enter-

ing angle of the counterscarp, set off 100 yards along the perpendicular to *i*, which will be the apex of the flanked angle of the ravelin. From *i*, draw lines to points in the faces of the bastions, 10 yds. from the shoulder angles; these lines to the points intersecting the counterscarp give the faces of the ravelin. The ditch of the ravelin is 20 yards wide, with counterscarp parallel to the escarp. The zigzag line now arrived at gives the inner side of the covert way—10 yds. wide—behind the glacis, which last slopes gradually toward the country, and is ordinarily the outer work of all. The tenaille is a comparatively low parapet sweeping the depressed interior of the ravelin, and commanded by the bastions and curtain. The caponniére (see CAPONIERE), forming a communication between the tenaille and the ravelin, consists of a passage between two low parapets, each with a glacis sloping toward the ditch, which is swept from the work. Nine ft. clear are allowed round the traverses on the covert way: at the re-entering angles of the covert-way, *places of arms* are formed by setting off 30 yards on each side, and with this as gorge, advancing faces inclined to each other at 100°. If the polygon had been a square, *cC* would have been $\frac{1}{8}$ *ab;* if a pentagon, $\frac{1}{7}$ *ab;* and for any polygon of more sides than seven, $\frac{1}{6}$ *ab.*—*Vauban's second and third systems* were those

Fig. 4.—Vauban's First System; Profile:
a, *b*, banquettes; *c*, parapet; *d*. ravêtement; *e*, escarp; *f*, counterscarp.

in which he adapted old walls to his modern improvements. Availing himself of the works already formed, he added counterguards in front of the corner-towers, thereby making hollow bastions, and avoiding the necessity of entirely rebuilding.

Coehoorn's system had counterguards in front of the bastions and parallel to them. The flanked angle of this ravelin had a fixed value—viz., 70°.—*Cormontaigne* widened the gorge of his ravelin, thereby reducing the length of the bastion face available for breaching from without. He also revived the step like formation of the covered way, originally seen in Speckle in the 16th c., and which gives defenders a continued line of fire from each traverse along the covered way.

The increase of the range of gun fire, and the accuracy with which the improved highly explosive shells were fired caused many changes in the methods of constructing forts. As high forts and traverses formed excellent targets for the gunners of the enemy, they were made lower, and their outward appearance made to harmonize with the general aspect of the surrounding land. The positions of guns were concealed as nearly as possible and 'masked batteries'

were constructed. The introduction of smokeless powder has rendered the task of concealing batteries more easy. In modern times the use of forts d'arret and of intrenched camps has chiefly comprised the system of permanent land fortifications. Forts d'arret are individual forts, complete in themselves, for small garrisons, and are used to protect mountain passes, defiles, or frontier posts. The intrenched camp has taken the place of the old continuous enceinte, when it is desired to fortify cities or positions in advance. This consists primarily of an outer line of forts and batteries placed sufficiently distant from the front of the city, so that the city cannot be bombarded from any outside position without coming under the fire of the outlying batteries.

During the American Civil War, when internal forces attempted the capital, the city of Washington furnished the best type of a city protected by a provisional intrenched camp; 43 forts and batteries, and 36 additional batteries mounted 99 rifled cannon in *embrasures* and 25 *in-barbette*, as well as 113 smooth-bore in *embrasures* and 147 *in-barbette*, making a total of 384 guns. But additional platforms were erected and made ready, so that a total of 743 guns could confront any new phases of attack.

These forts are placed only so far apart as to be mutually supporting, and in the intervals between them batteries are established for guns and howitzers. The calibre of the guns rarely exceeds seven inches and the howitzers are of the same or slightly larger calibre, the guns being so placed that they may bear directly on assaulting troops. These outer posts are connected by telegraph and telephone with each other and with the main fortifications of the city; search-lights are used at night by the garrisons to sweep the surrounding country on the lookout for the advancing enemy or by the attacking party to illuminate the works of the besieged; and war-balloons are used for the purpose of taking photographs of the interior of fortifications or of observing the enemy's movements from a distance. The rapid strides in telegraphy, wireless telegraphy, and telephony have practically revolutionized the methods of signalling. The inventions of new explosives; the perfection attained in the mechanisms of siege guns, mortars, rapid-firing guns, light artillery, etc., and even of small arms; the marked advance in the distance a shell may be thrown, and the increased efficiency with which these articles of war are handled have taken place within so short a time that inland fortifications are now of secondary consideration in the protection of maritime countries, the navy and coast defences being considered the most important bulwarks of the nation's strength. As against a foreign enemy, the United States has more need of coast defenses than many other nations, as her commercial centres are largely upon the sea.

Sea Coast Fortifications.—Sea coast defenses, from earliest times, have been of massive masonry. Many that still frown innocently upon the American coast, between

Boston and New Orleans, are chiefly monumental of obsolete defenses against hostile fleets. Two or three tiers of guns, in as many series of arched chambers, called *casemates*, with a fourth row mounted upon the exposed parapet, or rampart, were expected to cope successfully with the old 120–gun ship-of-the-line. Fort Moultrie, in rude form, in 1776, withstood resistance, with log ramparts, better than with later ones of stone, as in 1861, when sand bags were introduced to support its powers of resistance.

Modern guns, supplied with new explosives, shatter the hardest rock and splinter the toughest timber. The earth alone, and especially sand, will disarm the penetrating projectile of the present day. A single illustration harmonizes with the advent of the new system. Upon the trial of the first 81-ton gun, built at the Woolwich Machine Shops, near London, a mount of sand was erected on the proving grounds against the Thames embankment. Six times a bolt of 1,300 pounds was fired, increasing the powder-charge from 170 to nearly 300 pounds. When the last bolt was dug from the butt, it had entered but 47 feet, 5 feet under the surface of the sand.

Standard tables have long been under consideration to indicate the comparative resistance of earths and gravel, but in all cases, sand, which quickly closes upon what it receives, has been the most obdurate to defy deep penetration. The 20th century fortress is not a walled enclosure as of old, but a hole in the ground, or rather a series of holes called emplacements, built of concrete, and each of them containing one or more guns. No lofty, menacing structure strikes the eye of the observer who approaches the works, but instead there is likely to be rolling greensward with shrubbery, suggesting rather the skill of the landscape gardener than that of the military engineer. The real protection consists of 30 feet of iron and masonry and 30 feet of earth, which form a plane sloping outward, so that any projectile striking is promptly buried or glances off harmlessly.

And yet behind each sand pile, in separate sections, is to be found the most formidable land defense of modern times.

Fort Warren, on Georgies Island, in the harbor of Boston, Mass., which is one of the most notable fortifications in the world, has an armament of 30 guns and mortars. Several of the guns are 12-inch rifles, but the exact character of the armament is kept carefully secret by the military authorities. The mortars are arranged behind the cannon and are capable of throwing explosive shells for a distance of three miles, and with sufficient accuracy to destroy a vessel at that distance. Over 600 of these mortars, each of 12-inch calibre, are distributed among the various coast fortifications. A mortar of the new, modern type is 13 feet long and weighs nearly 30,000 pounds, and requires a charge of 125 pounds to send its conical projectile on its deadly mission. The modern 12-inch rifle

is 40 feet long, weighs 104,000 pounds, requires a charge of 520 pounds, and fires a 1,000-pound projectile a distance of 9 miles, with a velocity, upon leaving the muzzle, of 2,100 feet per second. The 12-inch gun could send the same projectile 14 or 15 miles, if the muzzle were sufficiently elevated, but it would be useless in aiming at an enemy who is beyond the limit of vision, for a ship is out of sight only seven miles away owing to the curvature of the earth. Most of the great rifles are mounted upon disappearing carriages, so they are safe from the fire of the enemy except at the very moment of firing. When its fire has been delivered the gun is lowered promptly below the parapet, and after being reloaded is lifted again to the firing position.

Each battery, however many guns may fall within its control, is operated at will, as if but a single piece were in position. A revetment of solid masonry holds the sand piles in position, and beneath the gun-carriages, which are exposed to the weather, are the necessary passages which communicate with all sections of the battery. Magazines and tackling for handling shot and shell are also under bomb-proof cover, and both placement and independent action of each piece are complete. At suitable distance, but within a practical community of range through adjustable range-finders, sand 'pits' for mortars are located. Each mortar revolves upon its own platform, and groups of fours, in closely related pits, can be handled, through signal communication, in connection with the heavy gun batteries, and command a joint delivery of fire upon the same hostile force. As with the gun placements, each mortar pit is independent, in magazine and other appliances, for efficient service.

At Fort Wadsworth, on Staten Island, N. Y., at The Narrows, is located another almost perfect system of coast defense, which is regarded by army officers as a model or typical artillery station. The fortification consists of three separate batteries or groups of guns—one battery of five 8-inch guns and two of two 10-inch guns each, a fire commander's station, three position finding stations, a power and electric plant, a storage battery plant of 60 cells for storing of light and power for the stations when the main power plant is not in operation (for example, if it should be wrecked by a shell), two electric searchlights of 60,000 candle-power beam and wires connecting the electric plant with all parts of the fortification and connecting the stations by telephone.

A typical artillery station is controlled as follows:

In command of the fortification is a fort commander. Under the fort commander are two fire commanders, each being in control of three groups of guns. Each group is composed of three guns, but the number may be more or less. Generally it is the number which one officer can supervise efficiently in action. Each of these officers is called a group commander. Between the fire commanders and the groups of guns is a line of range finders and posi-

tion finders under a range finder commander and position finding officer. Finally each gun has its firing crew of three, under command of a gun director, who may be an officer or a non-commissioned officer. The guns are of course behind emplacements. At Fort Wadsworth nature has provided a natural defense in a high hill with a slope terraced to the edge of the water. Behind the hill the fortifications are constructed. On the hill above is the fort commander's station, which controls the approaches to the harbor. The telephone places the fort commander in direct communication with those under his command. The printing telegraph, unknown in the days of the Civil War, is also used in the scheme of communication. The fort commander sitting in his station, communicates his orders to the fire commander by telephone, giving information as to the general scheme of defense. The fire commander communicates with the range finder commander, and then on down the line to the group commander and thence to the three gun directors under him. Under this system the fort commander has perfect control over the guns. If a hostile fleet approaches, he can detect it from his elevated station long before the ships' guns have the fort in range. He can direct the attention of the fire commanders to it, if they have not seen it, and inform them with what guns he wants the firing on it opened. In accordance with a map of the harbor which lies before him he can direct that these guns be turned against a certain target or ship. The fire commanders will transmit his order to the position finding officers, who will indicate the position and range to the group commanders. Then the guns will be aimed and fired. The position finder occupies the most important station, because upon the accuracy of his work depends the effectiveness of a shot which will cost the government $1,000 and possibly cost the enemy more than $2,000,000 or the value of a modern warship. In aiming the guns allowance is made for the moving enemy and for the force of the wind. The firing is done by stop-watch and every second of time is important.

Reduction of Fortified Positions.—Field works, against a fortified position, assume an attitude of counter-defense, as well as a cover for siege or assault. The relative strength of the assailing force belongs to another branch of the military art; but it must be proportionately greater, as the circumference of the investment enlarges, and must prove able, at any vital point, to meet any sally of the garrison, either by numerical superiority, or its equivalent, in artificial defense. Inequalities of the ground, commanding summits, a safe communication with the base of supply, are *strategic* conditions; but all are parts of the position to be assured. After estimating accurately the intervening distance, and at what nearer approach the encircling ditch may be filled, or bridged, for assault, the advance begins. A mortar battery in the rear, or guns in an elevated position, may play upon the intervening space to protect the *pioneers* in locating rifle-pits, while estab-

lishing the *first line* of works. The general advance, as thus initiated, is that of a ship beating against the wind, and the zig-zag course adopted borrows its name, *traverse*, from marine usage. Successive files of men dig these traverses, throwing the earth outward to the front, as a cover from fire, and thereby open a way for the advancement of guns, as well as of engineers and troops. A second line, *parallel* with the first, is opened to the right and left, where guns are at once placed in position. A third line, or *parallel*, is so planned as to place the defensive works at the mercy of the besieger. At Yorktown, Va., in 1781, with a river base and no sufficient escape by sea, the effectiveness of the advanced parallel compelled surrender. At Yorktown, in 1862, with works open at the rear for retreat, the scientific soldier in command rightly assumed that the scientific soldier at his front would attempt no assault until his third line was perfected and armed. Hence, he wasted the ammunition of the besieger to the last safe limit, and withdrew his own force in good order, to suit himself.

To this suggestive summary of fortifications, for the unprofessional reader, must be added the statement, that topographical and geographical features largely dominate in matters of attack or defense. *Boundary* lines, whether of mountain or river; interior or coastwise positions; the control of only one or of both banks of a navigable river, give character to defenses and methods for their reduction. Notable illustrations are found in the Dardanelles, the entrance to the Baltic Sea, the Suez Canal, and, prospectively, of vast moment, the Inter-Oceanic Canal in Central America. See EARTHWORKS; GABION; HORN-WORK; COAST DEFENCE; SIEGE; MINES, MILITARY; BOMBARDMENT; ATTACK; BATTERING-RAM; CAMPAIGN; GUNS; GUNNERY; ARTILLERY; ORDNANCE; CANNON; PROJECTILE; BATTLESHIP; NAVY; NAVIES, MODERN; TORPEDO-BOAT; TORPEDOES; ARMY; ARMIES; INFANTRY; CAVALRY; MILITIA; REGIMENT; etc.

Bibliography—Fieberger, *Text-book on Field Fortifications* (New York 1901); Woolwich, *Text-book of Fortifications and Military Engineering* (London 1893); Lewis, *Permanent Fortifications for English Engineers* (Chatham 1890); Fallott, *Cours d'Art Militaire* (Paris 1857); Viollet-le-duc, *Histoire d'une fortresse* (Paris 1873); Jastrow, *History of Permanent Fortifications* (Paris 1856); Mahan, *Permanent Fortifications*, revised by Mercur (New York 1887); the numerous books on the subject by Major-general Brialmont of the Belgian staff; and the documents and reports of the War Department of the United States.

FORTIFY, v. *fŏr'tĭ-fī* [F. *fortifier*, to strengthen—from mid. L. *fortĭfĭcārĕ*—from L. *fortis*, strong; *făcĭō*, I make]: to strengthen against the attack of an enemy by forts, works, etc.; to render stronger by forts, etc.; to strengthen against any attack; to invigorate; to confirm. FOR'TIFYING, imp. FOR'TIFIED, pp. *-fīd:* ADJ. made strong against attacks. FOR'TIFICA'TION, n. *-fĭ-kā'shŭn* [F.—L.]: the act

of fortifying; a fortified place; the art or science of fortifying places. FORTILAGE, n. *fŏrt'ĭl-āj*, in *OE.*, a little fort; a block-house.—SYN. of 'fortification': fortress; castle; citadel; bulwark; fort.

FORTIGUERRA, *for-tē-gwĕr'râ*, NICOLO: 1674, Nov. 7 —1735, Feb. 7; b. Pistoga: Italian poet. He was intended for the priesthood, and early went to Rome, where the power of the prelate Carlo A. Fabroni, who was his relative, speedily secured him advancement, and where he was ultimately raised by Clement XI. to the dignity of prelate and papal chamberlain. He was an ardent cultivator and protector of letters, yet his own compositions are prized more for a certain rich joviality of imagery and profuse facility of language than for beauty of style or conception. His chief work, *Il Ricciardetto*, was commenced in confutation of friends, who maintained that the striking ease and fluency of Ariosto, Berni, and other poets of a similar school, were but apparent, and in reality the fruit of deep art and severe labor. Fortiguerra, in a *few hours* threw off an entire canto of *Il Ricciardetto*, strikingly in imitation of the above poets, and continued the work at random much beyond its originally designed limits. It was published 1738, two years after his death, and met with great favor, notwithstanding the incredible incidents and licentious images with which it is replete.

FORTITUDE, n. *fŏr'tĭ-tūd* [L. *fortĭtūdō*, firmness, resolution—from *fortis*, strong: It. *fortitudine*]: that power of mind which enables a person to act or suffer with patience, and without flinching or complaining; endurance; resolution.—SYN. of 'fortitude': courage; bravery; resoluteness; strength; firmness.

FORT JACKSON. See JACKSON, FORT.

FORT LEE: village of Bergen co., N. J., at the lower end of the Hudson river palisades, directly opposite 160th st., New York. It contains numerous picturesque residences and churches, an establishment of Capuchins, and several factories, and is a popular resort for summer excursion parties.—Fort Lee derives its name from the earthworks erected there by the Americans during the revolutionary war. In 1776, Oct., the Americans under Gen. Washington were defeated by the British under Gen. Howe at White Plains, and driven from their position w. of Bronx river. Washington then crossed the Hudson and established himself at Fort Lee, while the British invested Fort Washington, directly opposite on the New York side. Following up their success the British determined on the occupation of Fort Lee, and sent an expedition of 6,000 men against it. Washington, aware of his inability to hold the place against such a force, retreated to the Delaware river. Pop. 1,800.

FORT MADISON, *fōrt măd'ĭ-son:* city, cap. of Lee co., Ia.; on the Mississippi river opposite Niota, Ill., 19 m. s.w. of Burlington, and on the Chicago Burlington and Quincy, and the Atchison, Topeka and Santa Fé railroads.

It has railroad repair and construction shops, car-wheel works, flour, saw, and paper mills, and manufactures of farming implements, foundry products, automobiles, shoes, etc. The fort was built in 1808, and the city settled in 1832. Pop. (1900) 9,278; (1910) 8,900.

FORT MAJOR: staff-officer next to the governor or commandant in a fortress. He is expected to understand the theory of its defenses and works.

FORT MORGAN. See MORGAN, FORT.

FORT MOULTRIE. See MOULTRIE, FORT.

FORT NECESSITY. After the capture of Jumonville's force (see GREAT MEADOWS), Washington threw up earthworks and made a stockade fort, which he named as above. It soon became crowded with Indians and colonial companies, and a South Carolina company of regulars under Capt. Mackay; and Washington left the latter in command and moved 13 miles farther on, where was a small settlement. But the place was indefensible; and after summoning Mackay and his men it was decided to retreat to Fort Necessity. The next morning the French were upon them, 900 men besides Indians. Washington led out his men to battle, but the enemy kept off and fired from the woods, in a heavy rain. Washington withdrew his men behind the low, flimsy embankment; and after an entire day of mutual firing, with heavy loss on both sides, the French proposed a parley. The English were at the last extremity, with food and ammunition nearly exhausted, and guns in bad condition; and Washington would not consent to let them send an officer to his camp to observe this, and only yielded when they proposed to have him send one to theirs. The French terms were that the English should retire with all their baggage except artillery, agree to build no more forts beyond the Alleghanies for a year, return the Jumonville prisoners, and leave two officers with the French as hostages. The terms were accepted; but had the French held out a few hours more they could have killed or captured the entire force.

FORTNIGHT, n. *fŏrt'nīt* [conr. from *fourteen nights*] fourteen days, or two weeks—referring back to the time when the day was reckoned from evening to evening: so we have *se'nnight*, or *sennight* for *sevennight*—that is, seven nights and seven days.

FORT PICKENS, a strong work on Santa Rosa Island, Fla., commanding the entrance to Pensacola harbor, and with Forts Barrancas and McRee opposite, defending the harbor and United States navy-yard at Warrington. Early in 1861, January, it was under command of Lieut. A. J. Slemmer and practically unoccupied, Slemmer, with a small garrison, being at Fort Barrancas. Fearing that the secessionists would seize the fort, Slemmer, January 10, transferred to it his garrison of 81 men from Barrancas, and on the 12th the governor of Florida seized Forts Barrancas and McRee, with 175 heavy guns, also the navy-yard, and demanded the surrender of Fort Pickens, which was refused.

A second demand was made on the 15th and a third on the 18th, both of which were refused. Slemmer strengthened the work and held it until relieved by the arrival of reinforcements April 12–13, when Col. Harvey Brown assumed command. Additional reinforcements were sent, and in June a regiment of New York troops, known as Wilson's Zouaves, was landed on Santa Rosa Island and encamped. On October 9 a body of Confederate troops, that had crossed from Pensacola and landed on the island during the night, surprised the camp of the Zouaves, and drove them back toward Fort Pickens, but the Zouaves being reinforced by four companies from the fort, the Confederates were driven in disorder to their vessels, with a loss of about 90 killed, drowned and wounded. The Union loss was 67 killed, wounded, and captured. No other serious attempt was made upon the fort, which remained in Union possession until the close of the War.

FORT PILLOW, constructed by the Confederates on the east bank of the Mississippi, about 40 miles above Memphis. It was bombarded by the Union fleet in its descent of the river and attack upon the Confederate fleet near Memphis, abandoned by the Confederates 1862, June 4, and June 5 was occupied by a small Union force. On 1864, April 12, it was garrisoned by a force of 557 men, with six guns, under command of Maj. L. F. Booth. At daybreak of the 12th Gen. J. R. Chalmers, of Forrest's cavalry command appeared before the fort with about 1,500 men, and after some hours of hard fighting drove the Union troops from their advanced rifle-pits back into the fort, which was attacked, and the Confederates repulsed. On a second attack there was a short and severe struggle in which more than half the garrison were killed or wounded, and about 160 white and 40 colored prisoners taken.

FORTRESS, n. See under FORT.

FORTRESS MONROE, *fawr'trĕs mŭn-rō':* defensive work on Old Point Comfort, Va.; commanding the water approach to Norfolk and the Gosport navy yard; on the n. side of the channel, 1 m. from Fort Wool on the s. side. It is the only fortification in the United States designated a fortress, covers 80 acres, was begun 1817, is an irregular hexagon in shape, has three channel fronts, is bastioned, has a tide-water ditch 8 ft. deep at high water, and a scarp wall rising 17 ft. above high water, and has cost $2,818,000. It was designed by Gen. Simon Bernard, French lieut.gen. of engineers, who was commissioned brev.brig.gen. of U. S. engineers by President Madison under a resolution of congress 1816. He intended making it a great fortified place rather than a simple fort, with accommodations for 371 guns exclusive of mortars, howitzers, and field-pieces, but his designs were measurably restricted. During the civil war it was a post of inestimable importance to the Federal govt., the rendezvous of thousands of troops, and the point of organization and departure of numerous military,

naval, and combined expeditions. Since the war it has undergone considerable alteration.

FORT ST. PHILIP. See JACKSON, FORT.

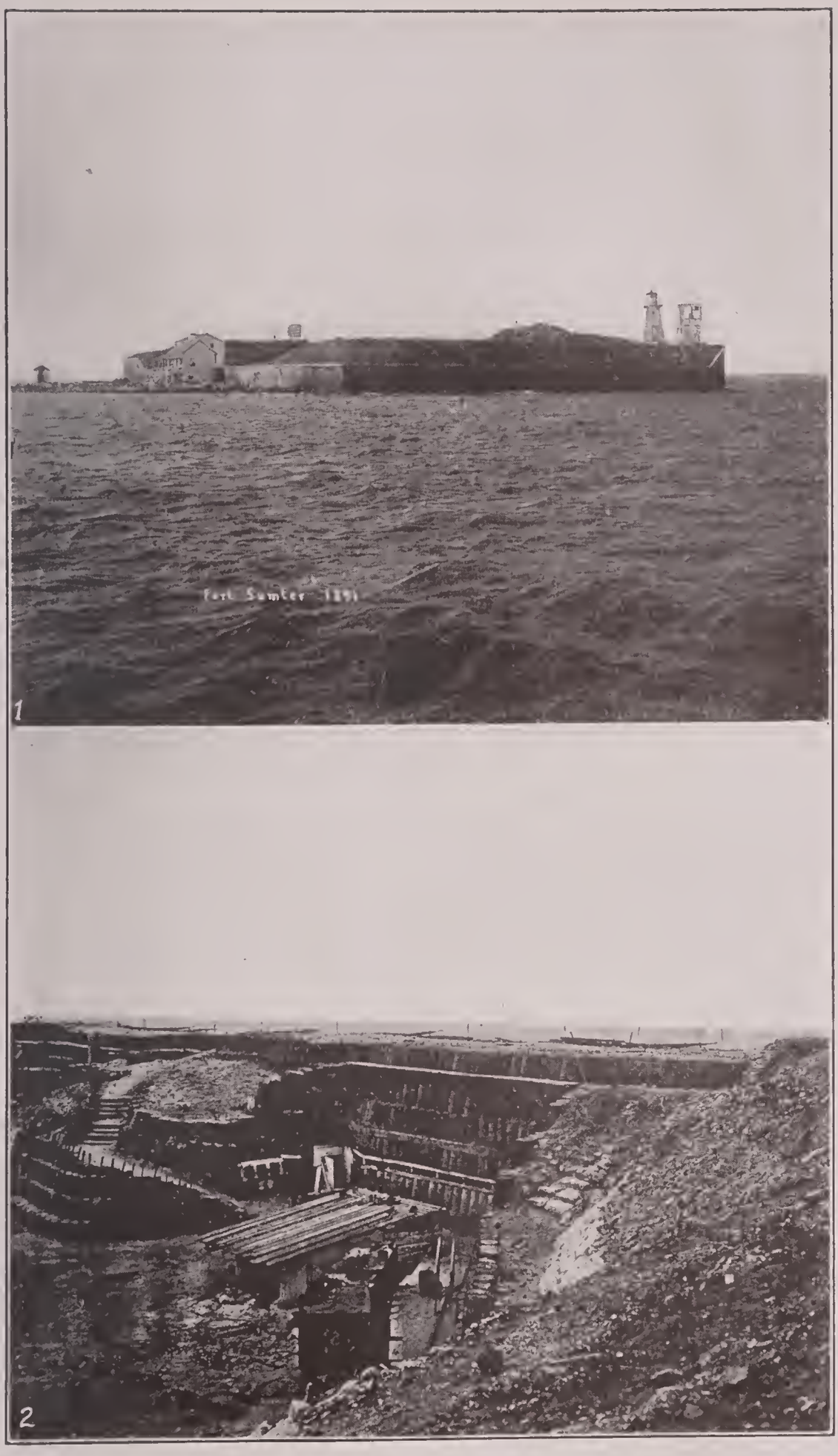
FORT SCOTT: city, cap. of Bourbon co., Kan.; on the Marmiton river, at the crossing of the Missouri Kansas and Texas, and the Missouri River Fort Scott and Gulf railroads, and the terminus of the Fort Scott Southeastern and Memphis railroad, 48 m. n.e. of Parsons, 98 m. s. of Kansas City, 111 m. s.w. of Sedalia, 380 m. w. of St. Louis. It contains Kansas Normal College, Mercy hospital, a public library, and has waterworks, electric street railroads, and electric lighting. Built on a plateau 800 ft. above sea level, Fort Scott is in a bituminous coal region, with extensive mining and shipping interests, cement rock and flag-stone quarries, foundries and machine shops, and several domestic manufacturing industries. Pop. (1900) 10,322; (1910) 10,463.

FORT SMITH: city, cap. of Sebastian co., Ark.; on the Arkansas river at the junction of the Poteau, at the Indian Terr. border; 158 m. w. of Little Rock; and on the Missouri Pacific, the Kansas City Southern, and the St. Louis and San Francisco railroads. The government fort and military reservation, from which the city takes its name, government and county court-houses, and schoolhouses are notable features. Fort Smith has coal and lumber, railroad construction and repair, furniture and other manufacturing interests. Pop. (1910) 23,975.

FORTS OF THE UNITED STATES: posts, armories, arsenals, and ordnance depots of the U. S. army, as reported 1903, Jan. 1. Those not garrisoned are indicated thus, *.

POSTS.

Adams, Fort ..... R. I.	Columbus Barracks ..... O.
Alcatraz Island ..... Cal.	Columbus, Fort ..... N. Y. H.
Allegheny Arsenal ..... Pa.	*Constitution, Fort ..... N. H.
Andrews, Fort ..... Mass.	Crook, Fort ..... Neb.
Angel Island ..... Cal.	Dade, Fort ..... Fla.
Apache, Fort ..... Ariz.	D. A. Russell, Fort ..... Wyo.
Armistead, Fort ..... Md.	Davis, Fort ..... Tex.
Army and Navy Gen. Hosp., Ark.	*Delaware, Fort ..... Del.
Assiniboine, Fort ..... Mont.	DeSota, Fort ..... Fla.
Baker Fort ..... Cal.	Douglass, Fort ..... Utah.
Banks, Fort ..... Mass.	DuChesne, Fort ..... Utah.
Barrancas, Fort ..... Fla.	DuPont, Fort ..... Del.
Bayard, Fort ..... N. M.	Eagle Pass Camp ..... Tex.
Benicia Barracks ..... Cal.	Egbert, Fort ..... Alas.
Bliss, Fort ..... Tex.	Ethan Allen, Fort ..... Vt.
Boise Barracks ..... Id.	Flagler, Fort ..... Wash.
Brady, Fort ..... Mich.	*Foote, Fort ..... Md.
Brown, Fort ..... Tex.	Foster, Fort ..... Me.
*Canby, Fort ..... Wash.	Fremont, Fort ..... S. C.
*Carroll, Fort ..... Md.	*Gaines, Fort ..... Ala.
Casey, Fort ..... Cal.	Gibson, Fort ..... Ind. T.
*Caswell, Fort ..... N. C.	*Gorges, Fort ..... Me.
Clark, Fort ..... Tex.	Grant, Fort ..... Ariz.
Clinch, Fort ..... Fla.	*Griswold, Fort ..... Conn.
Columbia Arsenal ..... Tenn.	Hamilton, Fort ..... N. Y.
Columbia, Fort ..... Wash.	Hancock, Fort ..... N. J.



1. Fort Sumter, 1891.
2. Interior of Fort Sumter, 1865.

FORTS OF THE UNITED STATES.

POSTS.

Harrison, Fort.....Mont.
Heath, Fort.....Mass.
Howard, Fort.....Md.
Huachuca, Fort.....Ariz.
Hunt, Fort.....Va.
*Independence, Fort.....Mass.
Indianapolis Arsenal.....Ind.
Jackson Barracks.....La.
Jackson, Fort.....La.
Jefferson Barracks.....Mo.
*Johnston, Fort.....N. C.
Kennebec Arsenal.....Me.
Keogh, Fort.....Mont.
Key West Barracks.....Fla.
*Knox, Fort.....Me.
*Lafayette, Fort.....N. Y.
Lawton, Fort.....Me.
*Lincoln, Fort.....N. D.
Liscum, Fort.....Alas.
*Livingston, Fort.....La.
Logan, Fort.....Colo.
Logan H. Roots, Fort.....Ark.
*Macon, Fort.....N. C.
Madison Barracks.....N. Y.
Mansfield, Fort.....R. I.
*Marion, Fort.....Fla.
Mason, Fort.....Cal.
*McClary, Fort.....Me.
McDowell, Fort.....Cal.
McHenry, Fort.....Md.
McIntosh, Fort.....Tex.
Mackenzie, Fort.....Wyo.
McKinley, Fort.....Me.
McPherson, Fort.....Ga.
McRee, Fort.....Fla.
Meade, Fort.....S. D.
Michie, Fort.....N. Y.
*Mifflin, Fort.....Pa.
Milay, Fort.....Cal.
Missoula, Fort.....Mont.
Monroe, Fort.....Va.
Montgomery, Fort.....N. Y.
Morgan, Fort.....Ala.
*Moultrie, Fort.....S. C.
Mott, Fort.....N. J.
Myer, Fort.....Va.
Myer, Fort, Signal Post.....Va.
Niagara, Fort.....N. Y.
Niobrara, Fort.....Neb.
*Oglethorpe, Fort.....Ga.
Ontario, Fort.....N. Y.
*Phœnix, Fort.....Mass.
Pickens, Fort.....Fla.
Plattsburg, Barracks.....N. Y.
*Popham, Fort.....Me.
Porter, Fort.....N. Y.
Preble, Fort.....Me.
Presidio of San Francisco....Cal.
*Pulaski, Fort.....Ga.
Reno, Fort.....Okla.
Revere, Fort.....Mass.
Riley, Fort.....Kan.
Ringgold, Fort.....Tex.
Robinson, Fort.....Neb.
Rodman, Fort.....Mass.
*Rosecrans, Fort.....Cal.
Sam Houston, Fort.....Tex.
San Diego Barracks.....Cal.
*Scammel, Fort.....Me.
Schuyler, Fort.....N. Y.
Screven, Fort.....Ga.
*Sewall, Fort.....Mass.
Sheridan, Fort.....Ill.
*Ship Island.....Miss.
Sill, Fort.....Okla.
Skagway.....Alas.
Slocum, Fort.....N. Y.
Smallwood, Fort.....Md.
Snelling, Fort.....Minn.
*Standish, Fort.....Mass.
*Stark, Fort.....N. H.
Stevens, Fort.....Ore.
*St. Francis Barracks.....Fla.
St. Philip, Fort.....La.
St. Michael, Fort.....Alas.
Strong, Fort.....Mass.
Sullivans Island.....S. C.
Sumter, Fort.....S. C.
*Taylor, Fort.....Fla.
Terry, Fort.....N. Y.
Thomas, Camp.....Ga.
Thomas, Fort.....Ky.
Totten, Fort.....N. Y.
*Travis, Fort.....Tex.
Trumbull, Fort.....Conn.
Vancouver Barracks.....Wash.
Wadsworth, Fort.....N. Y.
Walla Walla, Fort.....Wash.
War en, Fort.....Mass.
Washakie, Fort.....Wyo.
Washington Barracks.....D. C.
Washington, Fort.....Md.
Wayne, Fort.....Mich.
West Point.....N. Y.
Wetherill, Fort.....R. I.
Whipple Barracks.....Ariz.
Williams, Fort.....Me.
Winfield Scott, Fort.....Cal.
Wingate, Fort.....N. M.
Winthrop, Fort.....Mass.
Wood, Fort.....N. Y.
Worden, Fort.....Wash.
Wright, H. G., Fort.....N. Y.
Wright, Fort.....Wash.
Yates, Fort.....N. D.
Yellowstone, Fort.....Wyo.

ARMORIES, ARSENALS, AND ORDNANCE DEPOTS.

Augusta Arsenal.....Ga.
Benicia Arsenal.....Cal.
Frankford Arsenal.....Pa.
New York Arsenal.....N. Y.
Rock Island Arsenal.....Ill.
St. Louis Powder Depot.....Mo.
Sandy Hook Proving Ground. N.J.
San Antonio Arsenal.....Tex.
Springfield Armory.....Mass.
U. S. Powder Depot.....N. J.
Watertown Arsenal.....Mass.
Watervliet Arsenal.....N. Y.

FORT SUMTER: a defensive work, built of brick on a shoal in the channel to Charleston Harbor, about 3½ miles from the city of Charleston, the construction of which was begun about 1830, and which was still unfinished when South Carolina seceded, 1860, Dec. 20. When South Carolina seceded Maj. Robert Anderson commanded the U. S. forces in the Harbor, with his infantry and principal part of his command in Fort Moultrie. Fearing an assault on this indefensible fort he transferred his small force of less than 100 men to Fort Sumter, Dec. 26. Gov. Pickens of South Carolina demanded his immediate return to Fort Moultrie, and upon Anderson's refusal seized the public buildings in Charleston, took possession of Fort Moultrie, raised the Palmetto flag over the captured places, and began the construction of batteries on the neighboring islands to command the entrance to the harbor, and to reduce Fort Sumter, thus inaugurating war against the United States. 1861, Jan. 9, the steamer Star of the West attempted to land reinforcements and provisions for Anderson, but was fired upon and driven back. These were the first hostile shots of the civil war. The Confederates continued the construction of batteries, Anderson was being starved out, and April 8, President Lincoln notified Gov. Pickens that an attempt would be made to land provisions at the fort. On the 11th Gen. Beauregard, commanding Confederate forces at Charleston, acting under orders from President Jefferson Davis, demanded the evacuation of the Fort, which Anderson refused, and the bombardment of the fort began at 4.30 A.M. of the 12th, and continued until the afternoon of the 13th, when Anderson, after a gallant resistance agreed with Beauregard upon terms of evacuation, which were that the garrison should leave the fort on the afternoon of the following day with the honors of war. At the appointed hour the flag was saluted and hauled down, and the garrison moved out of the fort and boarded a U. S. vessel for New York. There was no one killed or wounded on either side during the bombardment, but by an accident, when saluting the flag, one man was killed and five seriously wounded. After the fort, with 78 serviceable guns, passed into Confederate occupation it was greatly strengthened, and defied all efforts of the army and navy to reduce it for nearly four years. Upon the appearance of Sherman's army in South Carolina, marching northward in its rear, the fort was evacuated, 1865, Feb. 17, and on April 14 the same flag that Anderson had lowered just four years before was raised by him over the fort.

FORTUITOUS, a. *fŏr-tū′ĭ-tŭs* [L. *fortu′ĭtŭs*, that happens by accident—from *fors*, chance: It. *fortuito:* F. *fortuit*]: happening by chance; casual; accidental. FORTU′ITOUSLY, ad. *-lĭ*. FORTU′ITOUSNESS, n. *-nĕs*. FORTU′ITY, n. *-ĭ-tĭ*. accident; chance. FORTU′ITISM, n. *-tĭzm*, in *phil.*, a doctrine or theory of causation which denies the existence of a final end or object in the course of things. Such a doctrine in the domains of nature results in theories

such as that of Darwin, who has been charged with denying design in the changes and developments of organized creatures, that is, the design of a single controlling mind, namely, of a supernatural creator. The opposite to fortuitism is teleology (q.v.), which is the theory of a final end or object in the processes of nature and history, as resulting from the plan or scheme originating in the mind of the Supreme Being. FORTU'ITIST, n. *-tist*, one who adopts or defends the principles of fortuitism, as opposed to a teleologist or believer in the doctrine of a final cause.

FORTU'NA, *for-tū'na*, called by the Greeks, *Tyche:* in classical myth. the Goddess of Chance. According to Hesiod, she was daughter of Oceanus; according to Pindar, sister of the Parcæ. She differed from Destiny or Fate, so far that she worked without law, giving or taking away at her own caprice, and dispensing joy or sorrow indifferently. She had temples at Smyrna, Corinth, and Elis. In Italy, she was extensively worshipped from a very early period; and had many names, such as *Patricia, Plebeia, Equestris, Virilis, Primigenia, Publica, Privata, Muliebris, Virgincnsis*, etc., indicating the extent and the minuteness of her superintendence. Particular honors were given her at Entium and Præneste; in the temple of the former city, two statues of her were even consulted as oracles. Greek poets and sculptors generally represented her with a rudder, as a symbol of her guiding power; or with a ball, or wheel, or wings, as a symbol of her mutability. The Romans proudly affirmed that when she entered their city, she threw away her globe, and put off her wings and shoes, to indicate that she meant to dwell with them forever. On a coin of the Emperor Geta she is represented sitting on the earth with her bosom bare, her right hand resting on a wheel, and holding in her left hand, resting on her lap, a horn of plenty.

FORT'UNATE ISL'ANDS. See CANARIES.

FORTUNATUS, *for-tū-nā'tŭs:* title of one of the best 'folk-books' (for the common people) (*Volksbücher*) ever written. It originated about the middle of the 15th c., though many of the tales and legends in it are of much older date. The opinion that it was worked up into German from a Spanish or English original may be considered as abandoned. The substance of the book is that Fortunatus, and his sons after him, are the possessors of an inexhaustible purse of gold and a wishing-cap, which in the end, cause their ruin: the moral is, that worldly prosperity alone is insufficient to produce lasting happiness. The oldest printed edition of the book now extant bears the date Frankfurt am Main 1509. Later German editions mostly bear the title, *Fortunatus, von Scincm Seckel und Wunsch-hütlein* (Fortunatus: Story of his Purse and Wishing-cap. Augsb. 1530; Nürnb. 1677; and Basel 1699). It has been reprinted in Simrock's *Deutschc Volskbücher* (3 vols. Frankt. am Main 1846). Various French versions of the German story have appeared from time to time,

as the *Histoire de Fortunatus* (Rouen 1670); which served as the groundwork of the Italian *Avennimenti de Fortunatus e de' Suoi Figli* (Naples 1676). From the German original, have sprung, with others, the Dutch version *Een Nieuwe Historie van Fortunatus Borse en van Zijnen Wensch hoed* (Amst. 1796); later, the English *History of Fortunatus and his Two Sons* (London, no date); the Danish *Fortunati pung og önskehat* (Kopen. 1664, 72, 95, 1756, 83); the Swedish *Fortunatus* (1694); and about 1690, two Icelandic versions, one in verse, another in prose. The first to dramatize the subject was Hans Sachs, in his *Der Fortunatus mit dem Wunschseckel* (1553), after whom was the English Thomas Decker with his *Pleasant Comedie of Old Fortunatus* (1600), a work which had the honor to make its reappearance in German about 1620. The most poetical edition of the story is that given by Tieck in his *Phantasus* (3 vols. Berlin 1816), See Grässe's *Die Sangenkreise des Mittelalters* (Dresd. and Leip. 1842), and Ersch and Gruber's *Encyclopædie* (sect. 1, vol. 46).

FORTUNATUS, *fawr-tū-nā'tŭs*, Venantius Honorius Clementianus: abt. 530–600; b. Treviso, Italy: bp. of Poitiers and Latin poet. He was educated at Milan and Ravenna, made special study of grammar, rhetoric, jurisprudence, eloquence, and poetry, and (564) removed to France where he spent the remainder of his life. Sigbert, king of Austrasia, received him cordially at his court, and for an epithalamium on the marriage of the king with Brunhild, appointed him court-poet. He remained at court two years, then visited Tours and Poitiers, and, calling on Queen Radegonda, living in retirement in the latter place, was induced to take orders and settle there. He became a presbyter, almoner, and chaplain of the queen, and through the friendship of Bp. Gregory of Tours, bp. of Poitiers 599. His writings, prose and verse, are very numerous, and consist of lives of the saints, hymns, epitaphs, and verses, in honor of his patrons.

FORTUNE, n. *fawr'tūn* or *fawr'chûn* [F. *fortune*—from L. *fortūnă*, luck, prosperity—from *fors*, chance: It. *fortuna;* Gael. *fortan*, fortune]: in *OE.*, a certain heathen goddess (see Fortuna); destiny; fate; the good or evil that befalls man; chance; accident; wealth; estate; possessions; the lot or portion of a man or a woman: V. to fall; to fall out; to happen. Fortunate, a. *fŏr'tū-nāt* [L. *fortūnātŭs*, prosperous, well off]: lucky; successful; happy; prosperous; favored; coming favorably. For'tunately, ad. *-lĭ*. For'tuneless, a. without wealth; poor; in *OE.*, luckless. Fortune-hunter, a man who seeks to enrich himself by marrying a woman possessed of wealth. Fortune-hunting. Fortune-teller, a person who pretends to foretell the events of one's life; such persons were classed among Vagabonds by a Scottish law 1579, which prescribed for them the penalty of scourging and burning on the ear. Fortune-telling. For'tunize, v. *-īz*, in *OE.*, to be endowed with a fortune; to be made happy.—Syn. of

'fortune, n': hazard; probability; luck; fate; fortuity; haphazard; destiny; event; success.

FORTUNE, *fawr'tūn*, ROBERT: 1813–1880, Apr. 13; b. in the country of Berwick, Scotland: botanist and traveler. After completing his education at a Scotch parish school, he served an apprenticeship as a gardener, and obtained employment in the Royal Botanic Garden at Edinburgh. He was afterward employed in the gardens at Chiswick, where his abilities and acquirements attracted the attention of London naturalists. He was, 1842, sent by the Botanical Soc. of London to n. China to make a botanical exploration. His journey was most successful, and he sent home a very large number of new and valuable plants. He gave an account of his adventures in *Three Years' Wanderings in Northern China*, a work which places its author in the foremost rank of contemporary explorers. Fortune, on his return to England, acted for a time as curator of the Physic Garden at Chelsea. In 1842, he was appointed by the East India Company to make investigations in China relative to the cultivation of the tea-plant; and on his return to England he published *Two Visits to the Tea Countries of China*. He was afterward employed by the U. S. govt., to collect seeds, chiefly of the tea-plant, in the East. It was Fortune who introduced the tea-plant from China into the N. W. Provinces of India. *Yedo and Pekin*, published 1863, relates specially to the natural productions and agriculture of the districts visited. He died at London.

FORTUNY, *fawr-tō'nē*, MARIANO: 1839, June 11—1874, Nov. 21; b. Reno, Catalonia: Spanish artist. He began to paint in boyhood, studied in the Acad. of Barcelona, and (1856) gained the prize which entitled him to live and study in Rome several years at the expense of the state. As soon as he had established himself there he made one round of the galleries, then ignored the grand works of the old masters, and began seeking subjects for his canvas in the everyday life of the streets. He spent three years in this line of character sketching and painting, and then (1859) joined Gen. Prim's expedition to Morocco, and while in Africa was captivated by the splendor and picturesque elements of the prevailing barbarism. The sketches and studies there made were the basis of his later fame and fortune. Returning from Africa he spent some time in Paris, studied the Meissoniers, made a business arrangement with the art-publishing house of Gonfil for the reproduction of his works in Europe and America, and afterward settled permanently in Rome. His chief works are *A Spanish Marriage*, sold for $15,000; *The Serpent Tamer*, bought by the late A. T. Stewart for a great sum; *The Amatuer of Prints; A Fantasia at Morocco; The Sword Sharpener;* and *The Academicians of Arcadia*. He was a most painstaking artist, and in consequence produced comparatively little, but his pictures were eagerly sought and brought large prices, many water-colors selling for $5,000 each.

FORTUYNIA, n. *fawr-tô-ĭn'ĭ-a* [named by Shuttleworth after *Fortuyn*, a Dutch collector]: genus of cruciferæ, typical one of the family *Fortuymidæ*, of the tribe *Orthoploceæ*.

FORT WAGNER: a work constructed by the Confederates near the north end of Morris Island, a low, narrow, sandy strip of land, about 3½ miles in length, on the south side of Charleston harbor. On the northern end of the Island was Fort Gregg, and the southern end was held by a small force of infantry and artillery. Preparatory to a combined naval and land attack on Fort Sumter and Charleston, it was determined to reduce Fort Wagner and take possession of Morris Island, and Gen. Gillmore, was selected to command the land forces. On 1863, July 10, Gillmore, who had concentrated 6,500 men and secretly placed 47 siege guns and field guns in position on the extreme northern end of Folly Island, attacked the Confederate position on the south end of Morris Island, effected a landing, carried the Confederate batteries of 11 guns, and by 9 A.M. occupied three fourths of the island and pushed his skirmishers to within 600 yards of Fort Wagner. The navy assisted with four ironclads. At daylight of the 11th an attempt was made to carry the fort by assault, which failed. The navy kept up an almost incessant fire upon it, and land batteries were established at distances ranging from 1,330 to 1,920 yards of it. Soon after midday of the 18th the navy and 41 light guns and siege-mortars opened a furious fire upon the fort, which was continued until nearly all its guns were silenced and its defenders driven into bomb-proofs, when about sunset, after 900 shot and shell had been discharged, Gen. G. C. Strong's brigade of six small regiments, supported by Col. H. S. Putnam's brigade of four regiments, made an assault. As the head of the column left the trenches the guns of Forts Wagner, Gregg, and Sumter opened on it, and as it neared Fort Wagner the Confederates mounted the parapet and poured in such a destructive fire of musketry that the leading brigade was repulsed; but the supporting brigade gained a foothold, which it kept for over an hour, when it was driven back.

Gillmore now turned his attention to Fort Sumter (q.v.), which, with the aid of the navy was, by August 23 reduced to a shapeless mass with almost every gun dismounted or silenced. Meanwhile regular approaches were made against Fort Wagner, thousands of heavy shells were thrown against and into it, and by August 26 the trenches were within 250 yards of it, the intervening space being a flat ridge of sand, scarcely 25 yards wide, and for a great part planted with torpedoes. The Confederates were driven from position behind this flat ridge and the approaches continued until within a few yards of the fort, when the heavy guns of the army and navy opened on it. Final operations were inaugurated September 5 at daylight, and in 42 consecutive hours 17 siege guns discharged 1,411 shells at the work, 1,247 of which struck it, the ironclad New Ironsides joined in the attack, the fort was

silenced, over 100 of the garrison killed and wounded, and an assault was ordered for the 7th. When morning came the fort had been abandoned and its garrison, with that of Fort Gregg, had escaped. The Union loss on Morris Island (July 10–September 7) was 381 killed, 1,372 wounded, and 565 missing, an aggregate of 2,318; the Confederate loss was 157 killed, 674 wounded, and 238 missing, an aggregate of 1,069.

FORT WASHINGTON, Capture of: 1776, Nov. 16. The public declaration of American independence was followed within a few days by the arrival of the British Admiral Howe in the harbor of New York, vested jointly with his brother with full authority to put down the revolution by pardons or bullets. Failing to negotiate a peace on the basis of abject submission and cravings of royal pardon, he began preparing for hostilities. Reinforcements were hastened to the British army encamped on Staten Island, till Sir Henry Clinton had a force of 35,000 men under his command. To defend New York Gen. Washington gathered troops from Va., Penn., Md., Del., N. J., and New England, and sent Gen. Mifflin to guard Forts Washington and Independence at the n. end of Manhattan island, one just above, the other just below Kingsbridge, the only avenue to the mainland; Fort Lee (q.v.) on the N. J. shore, nearly opposite to Fort Washington; Fort Montgomery on the Hudson, opposite Anthony's Nose; and Fort Constitution, six miles higher up the Hudson river. Chains were stretched across the channel and other obstructions provided, but despite these two British vessels passed up the river unharmed, exchanging shots with Fort Washington on their course. The appearance of the vessels created great alarm, but they made no direct attack upon the forts. In the meantime the British landed at Gravesend. The battle of Long Island was fought Aug. 27. Other British vessels were sent up the Hudson and East rivers. Washington ordered Gen. Heath to secure Harlem Heights and Gen. Putnam to evacuate New York and hasten to the Heights. Hence the main body of the Americans became encamped on the n. of the island across which they threw a double row of lines, 4½ m. below Kingsbridge. Two m. above these lines was Fort Washington, and a few miles below them were the British lines extending from river to river. In Oct. Washington held a council of war which decided that every American post on the island, excepting Fort Washington, should be abandoned, and on the 23d the whole army withdrew across Kingsbridge and established a fortified camp near the village of White Plains. A week later the British attacked and carried Chatterton's Hill, s. of the main camp. Howe's subsequent delays caused Washington much uneasiness and a new disposition of his troops was made, involving the withdrawal of all but about 2,600 men under command of Col. Magaw, which against the commander's judgment was left to hold Fort Washington. Scarcely had the main army retreated and Washington

established himself at Fort Lee, when Fort Washington was invested and attacked on all sides, Gen. Knyphausen with six Hessian regts. striking it from the flats near the Hudson, Lord Percy with a division of English and German troops on the s., Gen. Matthews on the e., and Col. Sterling from the Harlem River. Col. Magaw refused to surrender when surrounded, and the attack was made at daybreak. The garrison after a brave resistance was driven from the outer lines into the fort, and there sustained a terrific shelling till 1½ o'clock P.M., when further resistance was seen to be impossible, and Col. Magaw surrendered his entire force. The British then sent a force of 6,000 men to invest Fort Lee, and Washington began the dreary retreat to and beyond the Delaware river.

FORT WAYNE, *fōrt wān:* city, cap. of Allen co., Ind.; at junction of the St. Joseph's and St. Mary's rivers where they form the Maumee, 94 m. w.s.w. of Toledo, 142 m. s.s.e. of Grand Rapids, 148 m. e.s.e. of Chicago. The Pittsburg Fort Wayne and Chicago, the New York Chicago and Saint Louis, the Wabash, the Lake Erie and Western, the Grand Rapids and Indiana, and the Cincinnati Hamilton and Dayton railroads enter the city, which is one of the chief in the state in population and in manufacturing importance. Recent statistics give 397 manufacturing establishments using a capital of $9,203,613, employing 7,255 persons, paying $2,928,969 in wages, using $6,597,414 in materials, and yielding products valued at $12,525,222. These industries include foundries and machine shops, railroad shops, spoke and hub factories, lumber planing mills, stove factories, flouring mills, carriage and wagon shops, and outputs of soap, car-wheels, woolens, linseed oil, and church organs. Fort Wayne covers nearly 10 sq. m., and occupying a plateau at an altitude of 780 ft. is frequently called 'Summit City.' It is regularly laid out with over 130 m. of paved and macadamized streets, provided with electric street railroads, electric and gas lighting, improved waterworks, and a modern sewerage system. Among its public buildings is a court-house occupying the greater part of a square in the centre of the city, built in 1862 at a cost of over $1,000,000; other prominent buildings are the Federal institutions; jail built 1872, cost $100,000; Masonic Temple and opera house, built 1880, cost $50,000; a public library, towards the erection of which Andrew Carnegie donated $75,000. The educational buildings include several primary and grammar schools, a high school, Fort Wayne College (Meth. Episc.), Concordia College (theol. Ger. Luth.), F. W. College of Medicine, Westminster Seminary for Young Ladies (Presby.), the Academy of Our Lady of the Sacred Heart (Catholic) and St. Augustine's Academy (Catholic). Fort Wayne is the see of a Catholic bishop and has numerous fine churches of that and other sects, Methodist Episcopalians predominating, and its suburban cemeteries include Lindenwood covering 100 acres; a Catholic cemetery of 60 acres;

Jewish and German Lutheran cemeteries. There are also three public parks with monuments to Wayne and Lawton. La Salle visited and erected a stockade on Fort Wayne's site 1680, and it afterward became the site of the aboriginal Indian village of Kekionga, cap. of the Twightwee or Miami confederacy. For nearly half a century prior to the conquest of Canada, the French were in undisputed possession. In 1760 they were succeeded by the British; 1763 the Miamis recaptured their stronghold through the Pontiac conspiracy; and 1794, Gen. Anthony Wayne secured possession of the locality. A fort named in his honor was erected near the intersection of the rivers, and this gave the name to the village, which received a city charter 1840, when it had a pop. of less than 3,000. Pop. (1900) 45,115; (1910) 63,933.

FORT WILL'IAM: village in Inverness-shire, Scotland, near the west base of Ben Nevis, 63 m. s.w. of Inverness, and at the s. end of the Caledonian Canal. A fort was originally built here by General Monk, and rebuilt on a smaller scale by William III. It is an irregular work, with ditch, glacis, ravelin, bomb-proof magazine, and barracks for 100 men. It resisted sieges by the Highlanders 1715 and 1745. It is now converted into private houses. Pop. 2,800.

FORT WILL'IAM (India). See Calcutta.

FORT WILLIAM HENRY, and FORT GEORGE: two forts erected near the shore of Lake George, Warren co., N. Y., by the British; the first by Sir William Johnson at the head of the lake 1755, the other by Gen. Amherst, ½ m. e., 1759. Fort William Henry was the scene of important military movements and an Indian massacre, during the old French war in the colonies. In 1757, July, while the fort was garrisoned by 3,000 British troops under Col. Munro, and an additional force of 4,000 men under Gen. Webb was stationed less than 15 m. from it, the combined French and Indian force of 9,000 men under the Marquis de Montcalm, marched from Ticonderoga and laid siege to the fort, Col. Munro begged relief of Gen. Webb in vain, and after holding out six days surrendered, under a pledge to be allowed the honors of war and protected till his men could reach Fort Edward. But on withdrawing from Fort William Henry the 2,000 Indians that accompanied the French fell upon his men and brutally killed and wounded a large number. The French then destroyed the fort, which long ago became an almost untraceable ruin. On its site stands a large and widely known summer hotel.

FORT WORTH: city, cap. of Tarrant co., Tex.; on Trinity river at the confluence of the West and Clear rivers, and on the Fort Worth and Rio Grande, the Fort Worth and Denver, the Texas and Pacific, the Chicago Rock Island and Pacific, the Gulf Colorado and Santa Fé, and other railroads, 33 m. w. of Dallas, and 175 m. n. of Austin. Settled in 1849, its favorable river situation in

the centre of an extensive prairie region gained it the name of the 'Queen City of the Prairies,' and after extension of railways reached it in 1874 it had a phenomenal growth. Surrounded by a rich farming, horse, cattle, and sheep raising country, it has extensive interests on these lines, and the industrial establishments include enormous stock yards, packing houses, ice factories, flouring mills, grain elevators, tanneries, cotton and oil mills, foundries and machine shops, etc. Fort Worth has fine public institutions and buildings, university, colleges, public library, electric street railways, municipalized waterworks, and electric-lighting plant. Pop. (1900) 26,688; (1910) 73,312.

FORTY, n. *fŏr'tĭ* [AS. *feower*, four; *tig*, ten]: four times ten. FOR'TIETH, a. *-ĕth*, the fourth ten; the number following thirty-nine.

FORUM, n. *fō'rŭm* [L. *fŏrŭm*, open place, market-place —from *fŏrĭs*, out of doors]: in *anc. Rome*, a public place of meeting: in general, the courts of law; a tribunal; a market-place. In Rome the market-places were termed *fora venalia*, and the courts *fora judicialia*. Of the *fora judicialia*, the most ancient and celebrated was the *forum Romanorum*, or, *par excellence*, the *forum magnum*, occupying the quarter now known as the *campo vaccino* (or cattle-market). It stretched from the foot of the Capitoline Hill, where stands the arch of Septimius Severus, to the temple of the Dioscuri; was seven *jugera* in extent, and was surrounded by streets and houses. The boundary on the e. and n. was the *Sacra via*, of which the side nearest the forum was left open; while on the other were corridors and halls, such as those of the *argentarii* (bankers or money-changers). At a later period, the site of these was for the most part occupied by basilicas and temples. In the e. portion of this space, were held the earliest *Comitia* (q.v.) of the Romans—the *comitia curiata;* hence this part took the name *comitium*, and was distinguished from the forum strictly so called. Here were hung up for the benefit of the public the laws of the Twelve Tables; and after B.C. 304, the *Fasti* written on white tables to inform the citizens when the law-courts were open. The forum in the narrower usage of the word, probably ceased to be employed as a market-place about B.C. 472, when it became the place of assembly of the *Comitia Tributa*. Of the later *fora venalia*, the principal where the *forum boarium* (the cattle-market), the *forum suarium* (pig-market), *piscatorium* (fish-market), and *olitorium* (vegetable-market). Public banquets for the populace, and the combats of the gladiators, were, in the time of the republic, usually held in the great forum, which contained monuments of various kinds, e. g., the famous *Columna Rostrata* of C. Duilius, in memory of his victory over the Carthaginians. The rostra, or platforms from which public orations were delivered, form the boundary between the forum in its narrower usage and the comitium. After the time of Julius Cæsar and Augustus, the Forum Roman-

orum lost its importance as the central point of Roman political life. The other two *fora judicialia* were the *Forum Julii* and the *Forum Augusti*. See FORENSIC. Consult Platner, *Topography and Monuments of Ancient Rome* (1904).

FORUM COMPETENS, *fō'rŭm kŏm'pē-tĕnz*, in Law: the court to the jurisdiction of which the party is amenable.

FORWANDER, v. *fŏr-wŏn'dėr* [*for*, intens., and *wander*]: in *OE.*, to wander purposely and wearily; to go astray.

FORWARD, ad. *fŏr'wėrd* [AS. *fore*, before; *weard*, toward, situation]: toward a part or place before; in advance of something else; onward: ADJ. early in season; too ready; earnest; eager; quick; hasty; presumptuous or immodest; ready; prompt; in *OE.*, anterior; not behindhand: V. to help onward; to promote; to quicken or hasten; to transmit. FOR'WARDING, imp. promoting; transmitting; business now very extensive in the United States, in which a merchant assumes the expense of transmitting goods, and is compensated therefor by the owners, but has no interest in the goods transmitted. He is not held as a common carrier: see AGENT: also CARRIERS. FOR'WARDED, pp. FOR'WARDER, n. one who. FORWARD, ad. *-wėrd*, toward the front or forepart; onward. FOR'WARDLY, ad. *-lĭ*. FOR'WARDNESS, n. state of more than usual advance; cheerful readiness; want of due reserve or modesty; boldness.—SYN. of 'forward, v.': to advance; encourage; hurry; accelerate; quicken; hasten;—of 'forwardness': promptitude; promptness; impudence; confidence; presumption; eagerness; ardor; zeal; assurance.

FORWARD, WALTER, American statesman: b. Connecticut 1786; d. Pittsburg 1852, Nov. 24. He studied law and was admitted to the bar in 1806. In 1822 he was elected to Congress; and in 1841 was appointed by President Harrison first comptroller of the treasury, and was reappointed by President Tyler in September of the same year. On retiring from the cabinet in 1843 he resumed law practice. In 1849 he was appointed *chargé d'affaires* to Denmark, but resigned in 1851.

FORWASTE, v. *fŏr-wāst'* [*for*, intens., and *waste*]: in *OE.*, to waste utterly; to desolate.

FORWEARY, v. *for-wēr'ĭ* [*for*, intens., and *weary*]: in *OE.*, to weary excessively; to dispirit with labor; to wear out. FORWEAR'IED, pp. *-ĭd*, worn out.

FORWOOD, WILLIAM H., American military surgeon: b. Delaware 1838, Sep. 7. He was graduated at the medical department of the University of Pennsylvania and at Georgetown University, Washington, D. C.; entered the regular army as an assistant surgeon in 1861, and served throughout the Civil War He also served in many Indian campaigns; was surgeon and naturalist with the exploring expedition through Wyoming, Montana, and Idaho, in 1883; located military hospitals in Savannah, Ga., and the camp hospitals in Montauk Point, during

the Spanish war; and was appointed surgeon-general of the army with the rank of brigadier-general in 1902, retiring in the same year.

FOSCARI, *fos'kâ-rē*, Francesco, Doge of Venice: abt. 1370–1457. In 1416 he became procurator of St. Marks, and doge in 1423. His rule was a brilliant period of conquest and prosperity to his country, but a time of unexampled affliction to himself and family. His ambition fired him with passionate eagerness to exalt his reign by the glory of conquest, and speedily involved the state in a severe conflict with the Dukes of Milan; which, however, the doge's great military ability in the end turned into a source of glory and aggrandizement to Venice. His triumph was embittered by the successive loss of three sons; and the one who remained to transmit the name, and succeed to the inheritance of the family, was, 1445, denounced for having received bribes from the hostile generals, to use his influence with the doge in procuring less rigorous terms. Tried for this grave crime before the Tribunal of the Ten, and racked cruelly in view of his father, Giacopo Foscari was banished for life, under pain of death should he attempt to revisit his native land. In 1450, the assassination of one of the 'Council of Ten,' Hermolao Donati, was imputed (it seems, without ground) to Giacopo, who was consequently summoned from his exile, tried, tortured, and banished a second time on still more rigorous terms to the island of Candia. Grown reckless through suffering, and longing to see his home and country on any terms, Giacopo petitioned the Duke of Milan to intercede in his behalf with the senate, a step which, by Venetian law, was punished as a high crime, and led to the unfortunate Giacopo being for the third time subjected to torture and renewed banishment, on entering into which he died of grief. The doge had vainly besought permission to resign a dignity grown loathsome to him, from its imposing the barbarous obligation of witnessing his son's torture; but in the end he was deposed, and ordered to vacate the palace in three days. At the age of 87, decrepit from years, and bowed by sorrow and humiliation, Francesco Foscari, supported by his venerable brother, descended the Giant's Staircase, and passed out for ever from the ducal palace, the scene of such vain pomp and bitter misery. Pasqual Malapieri was elected in his stead 1457, and at the first peal of the bells in honor of his elevation, Foscari expired from the rupture of a blood vessel. Byron's tragedy, *The Two Foscari*, deals with this theme.

FOSCOLO, *fos'ko-lo*, Ugo: abt. 1778–1827, Oct. 10; b. at Zante, one of the Ionian Isles: Italian author. He went for study to Venice in his 16th year, and later to Padua for Melchiore Cesarotti's noble course of classic literature. His earliest efforts at poetical composition were modelled strictly on his favorite Greek classics; and, as early as 1797, his tragedy, *Il Tieste*, was received with favor by a critical Venetian audience. The dismemberment of the Venetian states, decreed by the treaty of

Campo Formio, bitterly incensed Foscolo's patriotic spirit, and inspired one of his most remarkable works, *Le Lettere di Jacopo Ortis*, which was received with immense popularity. Foscolo repaired to Milan on its being declared cap. of the Cisalpine republic, and there obtained the grade of officer in the Lombard legion. On the downfall of the republic, he retreated with the French into Genoa, where, in the midst of the terrors of a rigorous siege, he composed two exquisite odes to *Luigia Pallavicini Caduta da Cavallo*, and *All' Amica risanata*. Foscolo subsequently entered France with the intention of joining Napoleon's expedition against England, and prepared a much admired version of Sterne's *Sentimental Journey*, to exercise himself in English. On the failure of the plan, he returned to Milan, and prepared a splendid edition of Montecuculi's works, with notes and historical references—*Opere di Raimondo Montecuculi, per* Luigi Mussi (Milan, 1807–8), a very rare edition. At this time, he published his exquisite poem, in blank verse, *I Sepolcri*, which at once placed him among the classic authors of his country. In the same year, he was appointed to the chair of eloquence in Pavia, and occupied the post, until the professorship was suppressed in all the colleges of Italy. His inaugural address, *Dell' Origine e dell' Ufficio della Letteratura*, is a masterpiece of beautiful, noble, and patriotic writing. *Ajace* and *Ricciarda* are tragedies. From the time Foscolo lost faith in the sincerity of Bonaparte's intentions toward Italy, he employed the full powers of his wrath and sarcasm in denouncing his treachery. After various vicissitudes, he finally sought refuge in Britain about 1816, and soon mastered the language sufficiently to contribute to the *Quarterly* and *Edinburgh Reviews*. In London some of his best writings were published—viz., *Essays on Petrarca and Dante*, *Discorso sul testo del Decamerone*, *Discorso storico sul testo di Dante*, and various minor compositions. He died near London. His remains were finally deposited in the Church of Santa Croce, Florence, 1871. His works and letters were published, 12 vols. by Le Monnier (1850-62).

FOS'DICK, Charles Austin ('Harry Castlemon'), American writer of juvenile books: b. Randolph, N. Y., 1842, Sep. 6. He served in the Union navy in the Civil War from 1862 to 1865. Besides contributions to periodicals, he has published under the pseudonym 'Harry Castlemon' over 30 books for boys, among which are *The Gunboat Series* (1864–8); *Rocky Mountain Series* (1868–71); *Rod and Gun Series* (1883–4); *The Buried Treasure; The Steel Horse; Jack the Trader; The Houseboat Boys; A Sailor in Spite of Himself; The Pony Express Rider; The White Beaver; Carl the Trailer*.

FOSDICK, William Whiteman, American poet: b. Cincinnati, Ohio, 1825, Jan. 28; d. there 1862 March 8. He gained some distinction as a poet by a drama entitled, *Tecumseh*. He also published: *Malmiztic the Toltec* (1851), and *Ariel and Other Poems* (1855).

FOSS, Cyrus David, d.d., ll.d.: Bishop of the Meth. Episc. Church: b. Kingston, N. Y., 1834, Jan. 17. He graduated at Wesleyan Univ., 1854; was teacher of mathematics and principal of Amenia Seminary, N. Y., 1854–57; entered the ministry of the Meth. Episc. Church 1857; was stationed at Chester, N. Y., 1857–59, Brooklyn 1859–65, and New York 1865–75; was elected pres. of Wesleyan Univ. 1875, and served till 1880, May 12, when he was elected bishop. He was a member of the gen. conference of the Meth. Episc. Church 1872, 76, 80, and received the degree d.d. from Wesleyan Univ. 1870, and ll.d. from Cornell College, Io., 1879.

FOSS, Sam Walter, American poet: b. Candia, N. H., 1858, June 19. He graduated from Brown 1882, was engaged in editorial and literary work 1883–98, and has been librarian of the Somerville, Mass., public library from 1898. His published works include: *Back Country Poems* (1894); *Whiffs from Wild Meadows* (1895); *Dreams in Homespun* (1897); *Songs of War and Peace* (1898).

FOS'SA, or Foussa, a large, brown, unstriped carnivorous mammal of Madagascar (*Cryptoprocta ferox*), which has the form of a huge weasel (twice the size of a house-cat), and like a weasel is lithe, active and bloodthirsty. Its systematic place is by no means decided. It is placed by Beddard as representing a distinct sub-family of the civets; while Mivart and Lydekker regard it merely as a genus of civets. Zittel, in view of its dentition and the retractibility of the claws, among other features, regards it as occupying an intermediate place between the civets and the cats, and associated with such composite extinct forms as *Dinictis*, *Proœlurus* and *Pseudœlurus*, but classifies it in the *Felidæ*. It is the largest carnivore in Madagascar, and preys chiefly on birds and lemurs.

FOS'SA ET FUR'CA, or Pit and Gallows: ancient privilege granted by the crown to barons and others, which implied the right of drowning female felons in a ditch, and hanging male felons on a gallows.

FOSSA MARIANA, *fŏs'sâ mâ-rē-â'na:* canal dug by the army of Marius while encamped at Arles, near the mouth of the Rhone river b.c. 102. It extended from a point 15 m. above the present mouth of the river to near the Gulf of Stomalimne, and was cut to improve navigation of the mouths of the river and to keep the army employed.

FOSSANO, *fŏs-sâ'nō*, Ambrogio Stefanida (Ambrogio Borgognone, or Il Borgognone): eminent painter of the Milanese school, approximately contemporary with Leonardo da Vinci; date of birth and death unknown. He resided in Pavia 1486–94, when he executed his famous work in the Carthusian church and convent, worked in the church of San Satiro, Milan, 1494–97, and in that of the Incoronata, Lodi, some time from 1497; painted in a church in Bergamo 1508, and executed a series of frescoes illustrating the life of St. Sisinius in the portico of San Simpliciano. Milan, 1524.

FOSSE, n. sometimes Foss, n. *fŏs* [F. *fosse*, a ditch, a drain—from L. *fossa*, a ditch, a trench—from *fŏdĭō*, I dig: It. *fossa*]: a hollow place or ditch immediately outside the wall of a fortified place, commonly filled with water, forming an important part of the defenses; a kind of cavity in a bone. Fos′sa, n. *-a*, a depression; furrow. Fossette′, n. *-sĕt′* [F. dim.]: a little hollow; dimple; in *med.*, small ulcer of the transparent cornea, the centre of which is deep. Fos′sulæ, n. *-ū-lē*, minute cavities or canals; cavities of the joints or hinges of a bivalve shell.

FOSSIL, n. *fŏs′sĭl* [F. *fossille*—from L. *fossĭlĭs*, dug up, fossil—from *fossus*, dug]: a mineral dug out of the earth; the remains of plants and animals imbedded in the earth's crust and changed into a stony consistence: Adj. dug out of the earth. Fos′silif′erous, a. *-ĭf′ĕr-ŭs* [L. *fero*, I bear]: containing organic remains (see Fossiliferous Rocks). Fos′silize, v. *-īz*, to convert into a fossil; to become petrified. Fos′sili′zing, imp. Fos′silized, pp. *-īzd:* Adj. converted into a fossil. Fos′silist, n. one versed in fossils. Fos′siliza′tion, n. *-ĭ-zā′shŭn*, the process of converting animal or vegetable substances into fossils. Fossilol′ogy, n. *-jĭ*, science of fossils. Fossorial, a. *fŏs-sō′rĭ-ăl*, digging; burrowing. Fossil-paper, Fossil-wool, Fossil-cork, etc., familiar terms for certain varieties of amianthus. Fossil botany. See Palæontology.—Fossil footprints. See Ichnology.

FOSSIL: term formerly applied to whatever was dug out of the earth, whether mineral or organic; now restricted to the petrified remains of plants and animals imbedded in the earth's crust, which were formerly, and are sometimes still, called petrifactions. They occur in nearly all the stratified rocks, hence called Fossiliferous strata. It is difficult or impossible to detect them in the metamorphic rocks, for the changes that altered the matrix have also affected the organisms, so as either almost or altogether to obliterate them. In the fundamental mica-schist and gneiss they have escaped notice, if ever they existed; but comparatively recent investigation has proved their presence in or among those gneissose rocks which are the greatly metamorphosed representatives of the Lower Silurian Measures in the n. of Scotland. See Gneiss.

The conditions in which fossils occur are very various. In some Pleistocene beds the organic remains are but slightly altered, and are spoken of as sub-fossil. In this state are the shells in some raised sea-beaches, and the remains of the huge struthious birds of New Zealand, which still retain a large portion of the animal basis. In the progress of fossilization, every trace of animal substance disappears; and if we find the body at this stage, without being affected by any other change, it is fragile and friable, like some of the shells in the London clay. Most frequently, however, a petrifying infiltration occupies the cavities left in the fossil by the disappearance of the animal matter, and it then becomes hardened and solidified. Sometimes the whole organism is dissolved and

carried off by water percolating the rock, and its former presence is indicated by the mold of its outer surface and the cast of its inner in the rocky matrix, leaving a cavity between the cast and the mold agreeing with the size of the fossil. This cavity is occasionally filled up with calcareous spar, flint, or some other mineral; and we thus obtain the form of the organism, with the markings of the outer and inner surfaces, but not exhibiting the internal structure. The most advanced and perfect condition of fossilization is that in which not only the external form, but also the most minute and complicated internal organization is retained; in which the organism loses the whole of its constituents, particle by particle, and as each little molecule is removed, its place is taken by a little molecule of another substance, as silica or iron pyrites. In this way we find calcareous corals perfectly preserved in flint, and trees exhibiting in their silicified or calcified stems all the details of their microscopic structure—the cells, spiral vessels, or disk-bearing tissue, as well as the medullary rays and rings of growth. See PALÆONTOLOGY.

FOSSIL FERNS: as far as yet discovered, ferns appearing first in the Devonian period, but then only sparingly, not more than nine or ten species of that age having been observed. In the immediately succeeding Coal-measures, they suddenly reached their maximum development. The dense forests and the moist atmosphere of this period were so suited to their growth that they formed a large bulk of the vegetation. More than 350 species have been described, some of them tree ferns of a size fitting them to be the companions of the immense Sigillarias and Lepidodendrons whose remains are found associated with theirs in the Carboniferous rocks. 23 species have been found in Permian strata. Many new forms appear in the Trias, and their number is increased in the Oolite. The freshwater beds of this period contain numerous beautiful ferns, more than 50 species having been described. The marine beds of the Cretaceous period contain very few forms, and in the Tertiary rocks they are equally rare.

FOSSILIF'EROUS ROCKS: those which contain organic remains. If we except the lowest metamorphic rocks, in which, as yet, no fossils have been found, the term is equivalent to the 'stratified rocks,' when used comprehensively; but it may be applied also to a particular bed, as when we speak of an unfossiliferous sandstone compared with the neighboring fossiliferous shale or limestone.

FOSSORES, n. *fŏs-sōr'ēz* [L. *fossor*, digger, delver; *fodio*, I dig, I delve]: burrowing hymenoptera, sub-tribe of the hymenopterous tribe *Aculeata*. Many of the fossores are called sand-wasps. The sub-tribe is divided into eight families, *Scoliadæ*, *Sapygidæ*, *Pompilidæ*, *Sphecidæ*, *Bembicidæ*, *Larridæ*, *Nyssonidæ*, and *Crabronidæ*.

FOSTER, v. *fŏs'tėr* [AS. *fostrian*, to foster, to nourish—

from *foder*, food: Dan. *foster*, offspring: Sw. *fostra*, to foster]: to nourish; to bring up; to cherish; to forward or promote; to encourage; to indulge, as habits. FOSTERAGE, taking charge of the child of another, for care and education. FOS'TERING, imp.: ADJ. cherishing; bringing up. FOS'TERED, pp. *-tėrd*. FOS'TERER, n. *-tėr-ėr*, one who; a nurse; one who encourages. FOSTER-BROTHER, or -SISTER, nursed together, but not of the same parent. FOSTER-CHILD, a child nursed or reared by one not its parent; when the care of such a child is not undertaken in such a way as to amount to adoption (q.v.), there is no established legal relation. FOS'TERLING, n. *-lĭng*, a foster-child. FOSTER-MOTHER, one to whom a child of another is made over to nurse and bring up as her own.—SYN. of 'foster': to feed; nurture; support; bring up; patronize; forward; promote; sustain.

FOSTER, *faws'tėr*, ABIEL: 1735, Aug. 8—1806, Feb. 6; b. Andover, Mass.: Congl. minister and jurist. He graduated at Harvard College 1756, studied theol., and was pastor of a Congl. Church at Canterbury, N. H., 1761–79. Subsequently he studied law, was elected a member of the N. H. legislature 1780 and several times thereafter; was a member of the continental and federal congresses 1783–4, 1789–91, 1795–1803; was appointed a judge of the N. H. court of common pleas 1784, and afterwards became its chief-justice.

FOSTER, BENJAMIN, American artist: b. North Anson, Maine. A pupil in New York of Abbott Thayer, and in Paris of Luc Oliver Merson, and Aimé Morot, he obtained various recognition of his excellence in landscape, including a bronze medal at the Paris Exposition of 1900, and the Webb prize of the Society of American Artists in 1901. Among his works are: *Mists of the Morning* for which he received the Webb prize, and *Night Seene at the Paris Exposition* purchased by the French government for the Luxembourg Gallery.

FOSTER, BIRKET: English artist: b. North Shields, Northumberland, 1812; d. 1899, March 27. He was educated at Hitchin, Herts, was apprenticed to Mr. Landells, wood-engraver, by whose advice he became a draughtsman, and when 21 years old, established himself as an artist. His early work embraced numerous illustrations for children's books and the *Illustrated London News*, and in later years he illustrated Longfellow's *Evangeline*, Beattie's *Minstrel*, Goldsmith's *Poetieal Works*, Tom Taylor's grand work on English landscape, and other high art publications. While associated with Tom Taylor he began painting in water color, and afterward became the most widely known and popular English artist in that line.

FOSTER, CHARLES: statesman: b. Seneca township, O., 1828, Apr. 12; d. Springfield, Ohio, 1904, Jan., 9. He received a common-school and acad. education, engaged in mercantile business, and became the head of a successful firm. In 1870, 72, 74, 76 he was elected member of

congress from the 9th cong. dist. as a republican; in 1878 was defeated for re-election; in 1879 was elected gov. of Ohio, serving till 1884; and in 1891 was appointed sec. of the United States treasury. Subsequently he was a commissioner on several diplomatic missions of importance and performed his duties with great skill and satisfaction to his government.

FOSTER, George Eulas, Canadian statesman: b. Carleton County, New Brunswick 1847, Sept. 3. He was graduated at the University of New Brunswick in 1868, studied also at Edinburgh and Heidelberg, was professor of classics and history in the University of New Brunswick in 1872–9, and in 1882 was elected to the Canadian Parliament. In 1885–8 he was minister of marine and fisheries; in 1888–96 minister of finances. Upon his visit to England in 1894 in connection with Dominion finances, he negotiated a loan of $11,250,000. He was government leader in the Commons in 1895.

FOSTER, *faws'tėr*, John: 1770, Sep. 17—1843, Oct. 15; b. in the parish of Halifax, Yorkshire: English essayist. He was educated for the ministry at the Baptist College at Bristol, but after preaching several years to various small congregations with small success, he applied himself mainly to literature. His *Essays, in a Series of Letters*, were published 1805, while he was officiating as pastor of a Baptist chapel at Frome, Somersetshire. They were only four in number—On a Man's Writing Memoirs of Himself; On Decision of Character; On the Application of the Epithet Romantic; and On some of the Causes by which Evangelical Religion has been rendered less acceptable to Persons of Cultivated Taste; yet Sir James Mackintosh did not hesitate to affirm that they showed their author to be 'one of the most profound and eloquent writers that England has produced.' They have been remarkably popular, especially among thoughtful persons, and have gone through more than 20 editions. In 1808 Foster married the lady to whom his essays were originally addressed, and retired to Bourton-on-the-Water, Gloucestershire, where he lived a quiet, studious, literary life, preaching, however, in the villages near on Sundays. In 1819 appeared his celebrated *Essay on the Evils of Popular Ignorance*, in which he urges the necessity of a national system of education. He was long the principal writer in the *Electric Review*, and a selection from his contributions to that magazine was published by Dr. Price 1844. He died at Stapleton, near Bristol. Foster was a man of deep but somber piety. The shadows that overhung his soul were, however, those of an inborn melancholy, and had nothing in common with the repulsive gloom of bigotry or fanaticism. His thinking is rugged, massive, and original; and at times, when his great imagination rouses itself from sleep, a splendor of illustration breaks over his pages that startles the reader both by its beauty and its suggestiveness. Besides the works already mentioned, Foster pub-

lished several others, of which the most important is an *Introductory Essay to Doddridgs' Rise and Progress of Religion* (1815). Compare the *Life and Correspondence* of Foster (2 vols. 1846), edited by J. E. Ryland, republished in Bohn's Standard Library 1852.

FOS'TER, JOHN GRAY: 1823, May 27—1874, Sep. 2; b. Whitefield, N. H.: U. S. army officer. He graduated at the U. S. Milit. Acad. and entered the army as second lieut. of engineers 1846; took part with a co. of sappers and miners in the siege of Vera Cruz and the battles of Contreras, Churubusco, and Molino del Rey, where he was wounded, 1847–8; was brevetted first lieut. and cap. for services in Mexico, engaged on fortification and coast-survey duty 1848–54; asst. prof. of engineering at the U. S. Milit. Acad. 1855–57, on construction duty at Forts Sumter and Moultrie, S. C., 1857–61; assisted Maj. Anderson in transferring the garrison of Fort Moultrie to Sumter 1860, Dec. 26–7; was brevetted maj. for this service, and was present through the bombardment of Sumter. In 1861, Oct., he was appointed brig.gen. of vols. and ordered on duty with Gen. Burnside's expedition to N. C., and gained the brevet of lieut.col. for engineering services at Roanoke Island. He was promoted maj.gen. of vols. 1862, July, and assigned to command the dept. of N. C., conducted several important expeditions, was in command of depts. of Va. and N. C. 1863, July–Nov., and subsequently of Ohio and the South; was brevetted brig.gen. U. S. army for services at capture of Savannah, and maj.gen. for field services through the war, and was mustered out of the vol. service 1866, Sep. He commanded the dept. of Fla. 1865–6, and afterward became superintending engineer of river and harbor improvement.

FOS'TER, JOHN WATSON: soldier and diplomat: b. Pike co., Ind., 1836, Mar. 2. He was graduated at the State Univ. of Ind. 1855; student at Harvard Law School 1855–6, was admitted to the bar 1857, and practiced at Evansville, Ind., until the breaking out of the civil war, when he entered the Union army as major of the 25th Ind. Vols., becoming col. of an Ind. regiment; served under Grant and Sherman in the west. After the war he edited the Evansville *Journal* until 1873, when he was appointed minister to Mexico by President Grant; was reappointed to that post 1880 by President Hayes, who (1881) transferred him to Russia. This mission he soon resigned to become counsel for some of the foreign legations in Washington. President Arthur appointed him minister to Spain 1883. After negotiating a commercial treaty he resigned, 1885, but was returned on a special mission, concerning the treaty, by President Cleveland. President Harrison commissioned him 1891 to negotiate treaties of reciprocity with Spain, Germany, and San Domingo; he acted as agent of the United States in the Bering Sea arbitration with Great Britain; succeeded Mr. Blaine as secretary of state 1892; represented the United States in the Bering Sea arbitration 1893; and was called to China

1895 to act as adviser of Li Hung Chang in making peace with Japan.

FOS'TER, John Wells: geologist: 1815, Mar. 4—1873, June 29; b. Brimfield, Mass. He completed the scientific course at Wesleyan Univ. 1834, and was admitted to the Zanesville, O., bar 1835; assisted in a geological survey of Ohio 1837, and was occupied with this work until 1844, when he returned to Mass. and engaged in civil engineering. In 1847 he was appointed by the U. S. govt. to assist in a geological survey of the Lake Superior region, his reports first clearly establishing the richness of that mineral region. Afterward he returned to Mass. and helped to organize the 'Native American' party, from which he subsequently withdrew because he differed from them on the slavery question, and became active in the formation of the republican party. He spent much time in archeological study in the Mississippi valley; was for some time pres. of the Chicago Academy of Sciences, and was pres. of the American Association for the Advancement of Science 1869.

FOS'TER, Judith Ellen (Horton), American temperance advocate: b. Lowell, Mass., 1840, Nov. 3. She was married to E. C. Foster in 1869. She studied law and in 1872 was admitted to the State bar of Idaho. In 1870–84 she was superintendent of the legislative department of the National W. C. T. U., and upon the affiliation of the society with the Prohibition party, joined the Non-Partisan W. C. T. U., of which she was president in 1889–93. Her publications include: *Constitutional Amendment Manual* (1882); *The American Renaissance.*

FOS'TER, Lafayette Sabine, ll.d.: 1806, Nov. 22—1880, Sep. 19; b. Franklin, Conn.: statesman and jurist. He graduated at Brown Univ. 1828, was admitted to the bar 1831, was speaker of the Conn. house of representatives 1847, 48, 54; mayor of Norwich 1851–53: U. S. Senator 1854–67, pres. *pro tem.* of the senate 1865, and acting vice-pres. of the United States 1865, Apr.—1867, Mar. In 1869, he was offered and declined the office of prof. of law in Yale Univ., and 1870 was again elected speaker of the Conn. assembly, and also elected judge of the Conn. supreme court of errors and the superior court.

FOS'TER, Sir Michael, English physiologist: b. Huntington 1836, March 8; d. London 1907, Jan. 29. He was a surgeon in his native town 1860–6; became prælector of physiology at Trinity College, Cambridge, in 1870, and from 1883 was professor of physiology at Cambridge. He was president of the British Association in 1899 and was knighted the same year, and was member of Parliament for London University from 1900. He published: *Text Book of Physiology; Lectures on History of Physiology,* etc.

FOS'TER, Randolph Sinks, d.d.: Bishop of the Meth. Episc. Church: b. Williamsburg, O., 1820, Feb. 12.; d. Newton, Mass., 1903, May 1. He received a collegiate

education; became an itinerant minister of the Meth. Episc. Church 1837; held pastorates in the west till 1850, and was then transferred to the New York conference; preached in New York and Brooklyn till 1856, was pres. of Northwestern Univ., Evanston, Ill. 1856–60; elected prof. of systematic theol. in Drew Theol. Seminary 1868; appointed president 1870; and elected bishop 1872.

FOS'TER, Roger, American lawyer: b. Worcester, Mass., 1857. He studied at the University of Marburg, Yale, and the Columbia Law School, in 1880 was admitted to the New York bar, and was special counsel to the board of health of New York in 1896–8. His writings include, besides many pamphlets and articles in periodicals: *A Treatise on Federal Practice* (1890–2); *A Treatise on the Income Tax of* 1894 (1895). An article of his contained the first known use of the phrases 'trial by newspaper' and 'the court of public opinion.'

FOS'TER, Stephen Collins: composer of popular songs: 1826, July 4—1864, Jan. 13; b. Pittsburg, Penn. He was educated at Athens Acad. and Jefferson Coll., Penn., and afterward learned French, German, music, and painting. He wrote nearly 200 songs, in most cases both words and music, and nearly all of them became popular. His first song was *Open Thy Lattice, Love* (1842); his last was *Beautiful Dreamer* (1864). Among his songs are: *Old Folks at Home, Nelly was a Lady, Old Dog Tray, Old Uncle Ned,* and *Willie, We Have Missed You.*

FOS'TER, Stephen Symonds, American abolitionist: b. Canterbury, N. H., 1809; d. 1881. He was graduated at Dartmouth College in 1838; studied theology at the Union Seminary, became an anti-slavery orator, and was known for his radical methods. His attacks upon the Church for its position in regard to abolition aroused hostility against him, and his practice of interrupting church services was the cause of several mob disturbances. He published *The Brotherhood of Thieves: A True Picture of the American Church and Clergy* (1843).

FOSTORIA: city of Seneca co., Ohio. It has 5 trunk-line railroads, and is contiguous to a large oil and gas district. Manufactories are supplied by the city with natural gas practically free. There are glass factories, and the Harter Mills turn out about 1,500 bbls. of flour daily, shipping largely to Europe; the Cadwallader Milling Co. also has large capacity. There are buggy, barrel, stave, and box factories, planing-mills, banks, daily and weekly newspapers, and several public-school buildings. Pop. (1900) 7,730; (1910) 9,597.

FOTHERGILL, *fŏth'ėr-gĭl,* Jessie, English novelist: b. Manchester, England, 1856, June 7; d. London 1891, July 30. Her stories show a keen faculty of observation, and include: *Healey, a Romance* (1875); *Aldyth* (1876); *The First Violin* (1878), in which German life is faithfully portrayed; *Probation* (1879); *Kith and Kin* (1881); *Made or Marred; Borderland* (1886); *One of Three; The Lasses of Laverhouse*

(1888); *A March in the Ranks* (1890); *Oriole's Daughter* (1893).

FOTHERGILL PROCESS, *fŏth'ėr-gĭl prŏs'sĕs:* one of the numerous dry processes in photography (q.v.) which have for their object the preservation of sensitive plates ready for exposure. It is named after the inventor; and consists in the partial removal of the free nitrate of silver which adheres to the collodion film on withdrawing it from the sensitizing bath by washing with water, and the subsequent conversion of the remaining free nitrate of silver into albuminate and chloride of silver by pouring over the plate dilute albumen, containing chloride of ammonium, the excess of albumen being finally washed off by violent agitation with a copious supply of water. The plates being set aside to drain on folds of blotting-paper, are, when dry, ready for use. For details of manipulation, see handbooks of photography.

FOUCAULT, *fô-kō'*, Jean Bernard Léon: 1819, Sep. 18—1868, Feb. 13; b. Paris: natural philosopher. He began studying medicine but soon abandoned it for physical science, and directed his attention to optics with a view to improving Daguerre's photographic processes. He spent three years as experimental asst. to Prof. Donné while lecturing on microscopic anatomy, and invented an electric lamp which has been extensively used in physical experiments and for illuminating purposes 1844. In conjunction with Hippolyte Fizeau he conducted a series of experiments on the phenomena of light, and demonstrated that its velocity differs materially while passing through a vacuum or through transparent bodies; and by means of a pendulum and his invention, the gyroscope, proved the diurnal motion of the earth and measured it. He received the Copley medal of the Royal Soc. of London 1855; invented the Foucault polarizer 1857; determined the absolute velocity of light 1862; was appointed physical asst. in the imperial observatory at Paris, and has been made a member of numerous learned societies.

FOUCAULT'S PENDULUM, *fô-kōz'* [from Jean Barnard Léon *Foucault*]: pendulum for rendering visible the diurnal motion of the earth.

FOUCHÉ, *fô'shā*, Joseph, Duke of Otranto: 1763, May 29—1820, Dec. 26; b. Nantes, France; son of a sea-captain. He was educated at the Oratoire. He hailed the revolution with enthusiasm, and in 1792 became a member of the national convention. He voted for the death of Louis XVI., and was one of the commissioners sent to Lyon 1794 to reduce that city to obedience. In 1795, he was expelled from the convention as a dangerous Terrorist, and kept in confinement for a short time. After the revolution of the 18th Brumaire (1799, Nov. 5), in which he took part, Fouché, as minister of police organized an extraordinary police. He restrained the new government from deeds of violence, and by his advice the list of *émigrés* was closed, a general amnesty proclaimed, and the principle of modera-

tion and conciliation steadily adhered to. His remark upon the execution of the Duke d'Enghien was very apt: '*C'est bien pis qu'un crime, c'est une faute*' (It is much worse than a crime; it is a *blunder*). In 1809, the emperor conferred on him the title of the Duke of Otranto, with large grants from the revenues of the Neapolitan territory. When the English expedition landed on Walcheren (1809), the emperor was absent, and Fouché, who then held the portfolio of the interior, as well as of the police, organized the measures that led to the retirement of the English. In a proclamation, he made use of a boastful expression which lost him the favor of Napoleon, and in the following year he was forced to resign. In the campaign of 1813, the emperor summoned Fouché to his headquarters at Dresden, and sent him thence as gov. of the Illyrian provinces, and after the battle of Leipsic, to Rome and Naples, to keep a watch upon Murat's proceedings. Being recalled to Paris in the spring of 1814, he predicted the downfall of Napoleon even before his arrival in France. After the emperor's abdication, Fouché advised him to abandon Europe altogether. On his return from Elba, Napoleon again nominated him minister of police; but after the battle of Waterloo, Fouché placed himself at the head of the provisional govt., brought about the capitulation of Paris, and drew back the army behind the Loire, thereby preventing unnecessary bloodshed. At the Restoration, Louis XVIII. reappointed him minister of police; but he resigned his office in a few months, and went as ambassador to Dresden. The law of 1816, Jan. 12, banishing all those who had voted for the death of Louis XVI., was extended to Fouché also, who from that time resided in Austria. He died at Trieste, leaving an immense fortune. Napoleon, at St. Helena, called Fouché 'a miscreant of all colors:' and Bourrienne declares that he 'never regarded a benefit in any other light than as a means of injuring his benefactor'—specimens of exaggeration. The truth appears to be, that Fouché was a man whose highest principle was self-interest, but whose sagacity was not less conspicuous, and who never failed to give the governments which he served the soundest political advice. It is true, however, that he was unscrupulous in passing from one party to another, and that he was as destitute of political morality as Napoleon himself. In his private relations, his character was good. In 1824, appeared a work entitled *Mémoires de Fouché, duc d'Otrante,* edited by A. Beauchamp, which, though declared spurious by the sons of Fouché, is generally held to have been based on genuine documents.

FOUGADE, n. *fû-gād'*, or FOUGASSE, n. *fû-găs'* [F. *fougade*—from *fougue*, heat, fury]: a small mine made under an enemy's fortification, and charged with powder.

FOUGÈRES, *fô-zhār':* handsome town of France, dept. of Ille-et-Vilaine, on a hill on the right bank of the Couesnon, 28 m. n.e. of Rennes. It is well-built, with wide streets

and in the old quarter retains traces of the middle ages in the ancient arcades. In the neighborhood is a great forest containing Druidical remains. A famous battle took place here between the Vendean royalists and the Republicans, 1793, Nov. 15. Fougêres has dye-works, manufactures of sailcloth, canvas, flannel, hats, leather, and boots: and near it are glass and paper-works. Pop. 19,000.

FOUGHT, *fawt.* See under FIGHT.

FOUL, a. *fowl* [Goth. *fuls;* Icel. *full*, stinking, corrupt: Ger. *faul*, foul: AS. *fulan*, to corrupt: comp. Gael. *fual*, urine; *foill*, deceit]: not clean; offensive; dirty; coarse; disgraceful; rainy or tempestuous—applied to weather; contrary, as a wind; entangled; dangerous; ugly; false; unfair: V. to make filthy; to defile; to run against. FOUL'-ING, imp. FOULED, pp. *fowld.* FOUL'LY, ad. *-lĭ*, scandalously; disgracefully; not fairly or honestly. FOUL'NESS, n. filthiness; defilement. FOUL-FACED, *-fāst*, having an ugly or forbidding aspect. FOUL-FEEDING, living on unclean or gross food. FOUL-MOUTHED, using scurrilous, obscene, or profane language. FOUL-PLAY, unlawful, dishonest means; unfair or treacherous usage. FOUL-SPOKEN, nasty in language. TO FALL or RUN FOUL OF, to assail; to run against. A FOUL, the act of one boat running against another in a race. FOUL BALL, in *baseball*, a batted ball that first strikes the ground outside the foul ball lines or rolls into grounds outside the limits designated as fair. A foul ball may be caught 'off the bat' by the catcher, the ball being touched by the bat but not deflected from its course. FOUL STRIKES, in *baseball*, the first two foul balls struck by a batter, provided no strikes have been previously called. For rules see annual baseball guides.

FOULA, or FOULAH, *fow'la:* island of Shetland, parish of Walls, from which it is 20 m. west; length 3 m., breadth 1½. It rises to a height of 1,369 ft. above the sea. It is solitary, and has no regular communication with the mainland or larger islands. Its inhabitants subsist by fishing and farming on a small scale. On the island is a school maintained by the Soc. for Propagating Christian Knowledge; also a chapel connected with the Church of Scotland, and a chapel with a missionary maintained by the Congl. Union of Scotland. Foula is remarkably chiefly for its sublime cliffs of red sandstone on its n.w. side, where the precipice rises from the sea-margin nearly 1,200 ft., being the grandest headland in the British Islands. Among the sea-birds which occupy the cliffs is the Skua Gull, or Bonxie (*Lestris cataractes*). Of this powerful bird there are about 13 pairs, prized by the natives for their services in keeping down the numbers of the eagles on the cliffs. The landing-place on Foula is at a scattered hamlet of wretched thatched huts on the southeast. Here is a store, at which imported commodities are bartered for fish and other articles, and at which an apartment is let to strangers, there being no

inn. Foula, however, is rarely visited, and little is known of it even in Scotland. Pop. abt. 270.

FOULAHS. See FULAHS.

FOULARD, n. *fô-lârd'* [F. *foulard*, a silk handkerchief]: a light material of silk or silk-cotton, for ladies' dresses and handkerchiefs, originally from India.

FOULD, *fôld*, ACHILLE: 1800, Oct. 31—1867; b. Paris. He was educated at the Lycée Charlemagne, one of the most celebrated establishments of Paris. He originally belonged to the Jewish creed, his family being wealthy Jew bankers, but he adopted the Prot. faith. Early in life, he was initiated into financial transactions by his father, and his natural talents were developed by travel in Europe and the East. In 1842, he began his political career, being then chosen as a member of the council-gen. of the Hautes Pyrénées, and elected a deputy for Tarbes, chief town of that department. In the chamber of deputies he showed peculiar talent for questions of finance and political economy. At that period he was a stanch supporter of M. Guizot's home and foreign policy. After the revolution of 1848, Fould accepted the new régime of the republic, and offered his services to the provisional government. In 1848, July, he was elected representative for the dept. of the Seine. During the presidency of Louis Napoleon, Fould was four times minister of finance, and repeated resignations for state reasons did not prevent him from being again appointed on the occasion of the *coup d'état*, 1851, Dec. 2. He once more resigned his position Jan. 25 following, in consequence of the decree ordering confiscation of the property of the Orleans family. The same day, however, he was created a senator, and shortly afterward returned to power as minister of state. In this capacity, he superintended the Universal Paris Exhibition 1855, the completion of the palace of the Louvre and other great measures. He remained one of the most confidential ministers of Napoleon III. till 1850, Dec., when he was succeeded as minister of state by Comte Walewsky. He was out of office till 1861, Nov., at which date he was reappointed finance minister, his long experience and well-known ability as a financier pointing him out as the man to manage the crisis of the French finances at that time.

FOULDER, n. *fowl'dėr* [OF. *foldre*, or *fouldre*, a thunderbolt—from L. *fulgŭr*, a thunderbolt; *fulgŭra*, thunderbolts]: in *OE.*, lightning: V. to emit great heat. FOUL'DERING, a. burning.

FOUL IN THE FOOT: disease affecting cattle and sheep; distinct from foot-rot (q.v.). It appears around the hoof, usually between the claws, and is marked by inflammation, swelling, and the formation of ulcerous sores, causing severe pain, lameness, and if neglected, loss of flesh and general ill-health. It is produced by standing in mud or water, or on fermenting manure. Treatment: Remove at once to clean quarters; thoroughly

cleanse the affected parts, wash with castile soap and warm water, and apply spirits of turpentine, or carbolic acid diluted with eight times its bulk of water. In severe cases apply finely pulverized bloodroot and alum, in equal quantities.

FOULIS, *fow'lĭs*, ROBERT and ANDREW: eminent printers of Glasgow, brothers, whose names are usually classed together. ROBERT, the elder (1707, Apr. 20—1776; b. Glasgow) was bred as a barber—in those days of flowing periwigs, a profitable and respectable business. In winter, he and his brother ANDREW (1712, Nov. 23—1775, Sep. 18) employed themselves in teaching languages; and in summer, they made short excursions to the continent, and acquired considerable knowledge. In 1727, Andrew entered as a student at the Univ. of Glasgow. About the end of 1739, Robert began business in Glasgow as a printer, his first publications being chiefly religious. In 1742, he published an elegant edition in 4to of *Demetrius Phalereus on Elocution*, supposed to be the first Greek work printed in Glasgow. In 1743, he was appointed printer to the university. In 1744, he brought out his celebrated immaculate edition of Horace, 12mo, each printed sheet of which was hung up in the college of Glasgow, and a reward offered for the discovery of any inaccuracy. Soon afterward he took his brother Andrew into partnership; and for 30 years they continued to bring out some of the finest specimens of correct and elegant printing, particularly in the Latin and Greek classics, which the 18th c. produced, either in Britain or on the continent. To promote the fine arts in Scotland, Robert, after a two years' visit to the continent in preparation, commenced, 1753, an academy at Glasgow, for instruction of youth in painting and sculpture: the expense attending this institution led to the decline of the printing business, which, however, continued more than 20 years longer.

FOULK, GEORGE C., American naval officer: b. Pennsylvania about 1860; d. Kioto, Japan, 1894. He was graduated from the United States Naval Academy, and after service on the Asiatic station, was withdrawn from naval duty to act as secretary and interpreter to the embassy of the Korean empire, the first sent by that country to a western nation. In 1884 he became naval attaché to the American legation at Seoul. He traveled widely in the country, and was influential in introducing many western methods and manners. Later he again served in the navy, and became professor in Doshisha University at Kioto, Japan.

FOULKE, WILLIAM DUDLEY, American author: b. New York 1848, Nov. 20. He was graduated at Columbia in 1869, at the Law School of the University in 1871, practised law in New York, removed to Indiana, and there became a member of the State Senate (1882–6). In 1889–90 as chairman of a special committee of the National Civil Service Reform League, he made important investiga-

tions in connection with the United States civil service. In 1893 he was chairman of the Suffrage Congress at the World's Columbian Exposition. His publications are: *Slav or Saxon* (1887); *Life of O. P. Norton* (1899); *Moya* (1900).

FOUMART, n. *fô'mârt*, and FOULMART, n. *fôl'mârt* [as if from *foul* and *mart*, expressing the bad smell from the animal, but really a corruption of foumart *fouine*, the polecat, and Eng., *marte*, or *marten*]: the marten; commonly applied to the polecat.

FOUND, v. *fownd* [F. *fonder*, to found—from L. *fundārĕ*, to lay the bottom, to found—from L. *fundus;* F. *fond-* the bottom: It. *fondare:* comp. Gael. *fonn*, the ground, the land]: to establish on firm ground; to lay the basis of anything; to set up; to raise; to institute; to fix firmly; to originate. FOUND'ING, imp.: see FOUNDING, or METAL CASTING. FOUND'ED, pp. FOUN'DER, n. one who establishes; an originator. FOUNDATION, n. *fown-dā'shŭn*, the base of an edifice or building; the act of fixing or making such a base; the groundwork or origin of anything; an endowment; an institution. FOUNDATIONER, n. one who derives support from the foundation or endowment of a college, school, or other institution. FOUNDATION-MUSLIN, open worked, gummed fabric used for stiffening dresses and bonnets. FOUNDATION-SACRIFICE, in *compar. myth.*, sacrifice usual with many barbarous races, who sought to render buildings firm by drenching the foundation stones with blood, by burying a human victim beneath them, or by immuring in the wall itself a living victim. Tradition ascribes such sacifices in the middle ages, to the builders of the castle of Liebenstein in Thuringia, and of the walls of Copenhagen and Scutari. The custom lingers in parts of Asia and Africa, and in Polynesia and Borneo. FOUNDATION-SCHOOL, school supported by an endowment; an endowed school. FOUN'DRESS, n. a woman who originates or establishes. ON THE FOUNDATION, that has an interest and share in an endowment, as a scholar or fellow of a college.—SYN. of 'found'; to establish; set; place; base; ground; originate; predicate; build; rest.

FOUND, v. *fownd* [F. *fondre*, to melt—from L. *fundĕrĕ*, to pour out: It. *fondere*]: to form by melting a metal, and casting it into a mold. FOUND'ING, imp.: N. the act of casting or forming with melted metal in a mold. FOUND'ED, pp. FOUNDER, n. *fown'dėr*, one who is skilled in forming articles by casting metal in molds. FOUNDERY, n. *fown'dėr-ĭ*, or FOUNDRY, n. *fown'drĭ*, the place where casting liquid metal into molds to produce articles of various designs is carried on.

FOUNDA'TION, in Construction: either the natural surface or bed on which a building rests; or the lower part of the building which rests on the natural bed. 1. Foundation as the *bed*. The best is solid rock, or any kind of resisting incompressible stratum, free from water. Where there is no chance of water, sand forms a solid founda-

tion. When the soil is soft, loose, and shifting, a solid bearing can be obtained only by driving *piles* or long beams of wood, sharpened at the end, through the soft soil, till they reach a hard bottom. This is then planked or laid with crossbeams, on which the superstructure is built. The piers of many bridges are formed in this manner. Where the soil is soft, but not shifting, as in the case of made or deposited earth, the method of *Concreting* (q.v.) is adopted—i.e., a large surface is laid with broken metal or gravel, and run together with hot lime, so as to form a broad solid artificial rock, on which the building may rest. 2. Foundation as the base of building. The broader and larger the lower courses of the mason-work, the stronger the wall. The stones should, if possible, extend through and through, and project on each side of the wall.

In practice there are many cases in which the bed and the lower courses of the masonry structure jointly comprise the foundation proper, and render difficult or unnecessary the drawing of any marked distinction between them. Such combinations generally afford foundations of great permanency and strength, the most important qualities in connection with architectural and engineering works.

Oftentimes, in the erection of such works of great magnitude, as well as those of lesser importance, the requisite care and attention are not devoted to the construction of the foundations, thus seriously impairing the integrity of the superstructure. This carelessness, however, appears to develop periodically; but, the errors of one period are naturally so fruitful of injurious results that they not only lead to the exercise of greater care during the period following, but stimulate the development and adoption of more scientific and skilful methods. This is very clearly shown in the works constructed during the Roman Period.

In the best periods of art, the foundations have always been most attentively considered. The Romans formed solid bearings of concrete as above described, and gave great attention to secure the stability of their buildings. In the dark ages, when there was want of knowledge combined with want of materials and means, many buildings fell from the yielding of the foundation. Some of the earlier Gothic buildings also suffered from the same cause. But knowledge came with experience, and the foundations of the later Gothic buildings, during the 14th and 15th c., were built with extreme care, and on the virgin soil—the stones being as finely dressed as those above ground, where necessary to resist a strong thrust. And where the weight is thrown unequally on piers and walls, these detached points are all carefully united below the floor with a network of solid walls.

Bad foundations accepted because of the cost of making a good F. on unfavorable ground, have been the cause

to the ruin of many modern buildings. It is good economy to spare no expense to make the foundation good.

FOUNDER, v. *fown'dĕr* [F. *fondre*, to melt—from L. *fundĕrĕ*, to pour out]: to fill or be filled with water and to sink in consequence, as a ship in the sea; to disable or lame a horse by causing sores in its feet or legs; to trip or fall, as a horse. FOUN'DERING, imp. FOUN'DERED, pp. *-dĕrd:* ADJ. sunk in the sea, as a ship; made lame in the feet by inflammation, etc. *Note.*—Perhaps from OF. *fondrer* (as in F. *effondrer*, to fall down to bottom), to sink in, as if from F. *fond*, L. *fundus*, the bottom.—See SKEAT.

FOUNDER, or LAMINITIS: inflammation of the laminæ of the foot, frequent among horses, rare in cattle or sheep. Horses with very small, or with large and flat feet are peculiarly susceptible to this disease, and heavy horses more than light ones. In acute cases there is a high degree of fever in the affected feet, severe lameness, intense pain, and the exudation of lymph or blood between the sensitive and horny laminæ. It affects the fore feet more frequently than the hind ones, and sometimes extends to the muscles of the fore legs and chest, and closely resembles rheumatism. F. may result from a variety of causes, such as overdriving or overloading, exposure to cold air, or drinking cold water when heated or exhausted, disturbance of the digestive organs from improper feeding, disease of the lungs, or bad shoeing. In acute cases prompt treatment is demanded. The shoes must be removed, a deep bed of straw provided and the horse encouraged to lie down, in order to relieve the pressure on the feet. A laxative may be immediately administered. Every four or five hours 20 drops of tincture of aconite should be given in a little water until six doses have been taken or relief obtained. The feet should either be poulticed with bran or the hydropathic method of packing adopted. In the latter case the feet should be thoroughly washed, a sponge fitted for a cushion for each foot should be saturated with tincture of arnica and water (in the proportion of eight ounces of the former to a gallon of the latter), and kept in place on the sole of the foot by ample bandages, which also should be saturated with the mixture. These bandages should be kept constantly moist and remain on for several days. Food should consist of mashes, roots, and grass or hay Water should be given frequently, and a little cream of tartar may be added if thirst is intense. When the inflammation subsides the hoof should be thinned with a rasp. If in summer, the horse should be turned into a pasture for a few weeks, but must be sheltered from storms. The stable floor should be deeply covered with earth or other soft material. Chronic cases of F. are seldom or never cured, but may be greatly relieved by placing a cushion of leather or rubber, well covered with tar or oil, between the shoe and the hoof, frequent oiling of the hoof, and furnishing some soft material upon which to stand when the horse is in the stable. Preventive measures are far more successful than attempts to cure. Wherever possible F. should be treated by a competent veterinarian.

FOUNDING.

FOUND'ING, or MET AL-CAST'ING: art of obtaining casts of any desired object by pouring melted metal into molds prepared for the purpose. It has risen to great importance in recent times, on account of the many new applications of iron. Iron-founding, brass-founding, type-founding, as well as casting in bronze and zinc, are the principal divisions of the art. Casting of finer metals and alloys, as gold, silver, and German silver, is conducted on a smaller scale.

When the casting of an object is required, it is necessary, in the first place, to make a pattern. Suppose it to be a plain round iron pillar, on which a gate is to be hung. A pattern of this is turned in some wood which can be readily made smooth on the surface, such as pine, and then varnished or painted so as to come freely out of the mold. This wooden pillar, or any similar pattern, is always made in at least two pieces, the division being lengthwise, for a reason which we shall presently see. The next step is to prepare the mold. The molds used by the iron-founder are either of sand or loam, but generally of fine sand. Proceeding with the preparation of the mold, the founder takes a moulding-box, which is composed of two open iron frames with cross-bars, the one fitting exactly on the other, by means of pins in the upper, dropping into holes in the lower frame. One-half of the box is first filled with damp sand, and the pattern laid upon it, a little dry *parting sand* being sprinkled on the surface. The upper half of the box is then put on, and sand firmly rammed all round the pattern. The box is then carefully opened, and, when the pattern is removed, its impression is left in the sand. The mold at this stage, however, is generally rough and broken. It is necessary, therefore, to give it a better finish, which is done by taking each half of the mould separately, repairing it with a small trowel, and re-introducing the corresponding half of the pattern till the impression is firm and perfect. Finally, the surface of the mold is coated with charcoal-dust, which gives a smooth surface to the future-casting. These columns being made hollow, there is yet another matter to arrange before the casting can be made—namely, the *core*. In the instance before us, it would be simply a rod of iron, covered with straw and loam to whatever thickness the internal diameter of the column happened to require. The core of course occupies the centre of the mold.

The cast iron is melted with coke in a round fire-brick, furnace, called a *cupola*, the heat being urged by means of a powerful blast, created by fanners revolving at high speed. The molten metal is run from a tap at the bottom of the furnace into a malleable iron ladle, lined with clay, from which it is poured into the mold through holes called *runners* or *gates*. When the mold is newly filled, numerous jets of blue flame issue from as many small holes pierced in the sand. These perforations are necessary for the escape of air and other gases produced by the action of the hot metal on the mold. Care must also be taken not to have the mold too damp, otherwise steam is generated, which may cause holes in the casting, and even force part

of the metal out of the mold. The casting remains covered up for a time, in order to cool slowly, and is then removed by breaking away the sand, and drawing out the core. In the case of a fluted, or otherwise ornamented pillar, the pattern would require to be in at least four pieces instead of two, because it is only a plain pattern that will come out of the mold in halves without tearing away the sand. When a pattern is necessarily made in several pieces, it is drawn out of the mold bit by bit, to the right or left, as the case may be, and so parts from the sand without breaking it. If a small ornamental vase was to surmount the pillar, the founder would prepare the pattern of this in a more elaborate manner. He would first mold it in wax or clay, from which a cast in plaster of Paris is made; from that a cast is taken in an alloy of tin and lead, which, after being sharply chased, and divided into the required number of pieces, is used as a pattern to cast from. All ornamental patterns, such as figures, serolls, leaves, enriched moldings, and the like, are made in this way, whatever metal the ultimate casting is to be produced in. Very large engine cylinders, pans, and such vessels, are cast in loam-molds, which are built of brick plastered with loam, then coated with coal-dust, and finally dried by means of a fire. This method is adopted with large plain objects, where a pattern would be expensive, and when few castings of one kind are required. Iron molds, coated with black-lead or plumbago, have recently been introduced for casting pipes into: they are greatly more expensive than any other kind, but they enable the founder to dispense with a pattern, as, when once made into the required form, they are not destroyed like molds of sand or loam at each casting. Bronze and brass are cast in molds prepared with finer sand than that used for iron. Pewter and similar soft metallic alloys are cast in brass molds. The type-founder uses molds of steel, now worked to a great extent by a machine.

The variety of articles produced by founding or casting is very great, e.g. cylinders, cisterns, paper-engines, beams, boilers, pumps, and heavy parts of machinery generally, gates, railings, lamps, grates, fenders, cooking-vessels, and the like, in iron: cannon, many portions of machinery, and numerous ornamental objects, in brass: sculpture and other works of art in bronze and the more costly metals. One of the remarkable castings for the requirements of modern engineering, was the cylinder of the hydraulic press used for raising the tubes of the Britannia Bridge. It measured 9 ft. $\times$ 3 ft. 6 inches, the metal being 10 inches thick, and weighed more than 20 tons. It remained red hot for three days, and it was seven days more before men could approach it to remove the sand. Sole plates for steam-hammers, and for other purposes, have been cast more than double this weight, but the same care was not required in their execution. In regard to sculpture, perhaps the most wonderful casting known is the colossal statue of Bavaria at Munich, finished 1850, 54 ft. high, the length of the face being equal to the height of a man. It took eight years to cast, and the cost of the bronze used, was about $50,000.

FOUNDLING, n. *fownd'lĭng* [Dut. *vondeling*, a foundling (see FIND)]: a child found without a parent or owner; one whose parents are unknown.

FOUND'LING HOS'PITAL: establishment in which children abandoned by their parents and found by others, are nurtured at public expense. Among ancient nations, such institutions were known, though as the law usually placed the power of life and death in the hands of the father, and permitted him to sell his children into slavery, it is probable that infanticide, as among eastern nations at the present day, was the usual mode of solving the difficulty which foundling hospitals are intended to meet. Desertion, however, and exposure, being less atrocious, were more frequent; and to meet these, the reception and education of foundlings were enjoined on private persons, to whom they were assigned in property. When this means of support failed, they were protected by the state. The Egyptians and Thebans are praised by the classical historians for discouraging the exposure of infants. The practice of exposing infants probably prevailed even among the Germanic nations previous to the introduction of Christianity; and though Tacitus says that infanticide was forbidden, it is said to have reached a fearful height, in Iceland in particular. From the period at which Christianity became the state religion of the Roman empire, a sensible change in the spirit of legislation on the subjects both of infanticide and exposure is apparent; and though the latter is spoken of by Gibbon as one of the most stubborn remnants of heathendom, it gradually gave way, and the Christian Church, at a very early period, encouraged the establishment of foundling hospitals. So early as the 6th c., a species of foundling hospital is said to have existed at Treves. The bishop permitted the children to be deposited in a marble basin which stood before the cathedral, and gave them in charge to members of the church. But the first well-authenticated one is that of Milan, established 787, probably in obedience to the 70th article of the Council of Nice, which enjoined that a house should be established in each town for the reception of children abandoned by their parents. It is probable, however, that foundling hospitals existed extensively at an earlier period, as mention is made of them in the capitularies of the Frankish kings. In 1070, a foundling hospital was established in Montpellier; in 1200, Eimbeck; in 1212, Rome; in Florence, 1317; in Nürnberg, 1331; in Paris, 1362; in Vienna, 1380. In France, the utility of these establishments, which were the special labor of Vincent de Paul (q.v.) was early called in question; and letters-patent of Charles VII., 1445, affirmed that 'many persons would make less difficulty in abandoning themselves to sin when they saw that they were not to have the charge of the upbringing of their infants.' In Germany, the system of foundling hospitals was soon abandoned, the duty of rearing the children being, as in England, imposed by law, first on the parents, then on

more distant relatives, whom failing, on the parish, and last of all, on the state. The reproach made by Rom. Cath. countries against this more natural arrangement——that it tends to promote infanticide—is said to have been in no degree established by statistical investigations. The revolutionary government of France not only adopted the system of foundling hospitals handed down to it, but in 1790 declared all children found to be children of the state (*enfants de la patrie*). The imperial government, 1811, continued and further systematized the arrangement by which the foundling hospitals had become government establishments, and the children, children of the state. This state of things remained unaltered till recently, and every considerable town had its foundling hospital. At Paris, each child was committed to a special nurse, many of whom were retained on the premises, and paid 40 centimes a day. Other nurses were brought in from the country in carriages kept by the hospital, which returned conveying the children with their new mothers. The children thus boarded out were inspected twice a year by local medical men appointed for the purpose. The parents and relations were permitted to reclaim them at any period, or they might be legally adopted by any French citizen in a condition to maintain them. Within the last 30 years the whole system has been greatly modified, the changes being in the direction recommended in M. Gasparin's report. A large number of hospitals have been suppressed. The turning-box has been abolished, or, where retained, placed under such restrictions as make the abandonment public; the officers of the hospital, on receiving the infants, make full inquiry into the position and residence of the mother. The new-born infants have a separate department assigned them, and assistance is given at their own dwellings to mothers in circumstances to require it. The very name of 'enfants trouvés' has been exchanged for 'enfants assistés.' The result has been a vast diminution of the number of exposures, and a great saving of expense to the country, and lessening of mortality among the infants. The present number of foundling hospitals in France is believed to be about 130. In Spain they number about 70. Portugal, Belgium, Austria, and Norway possess foundling hospitals; and those of Moscow and St. Petersburg are among the largest in the world.

The foundling hospital in London was established by Captain Thomas Coram, a benevolent sailor, 1739. The system of foundling hospitals never having been approved in England, the London hospital was changed 1760 to what it now is—a hospital for poor illegitimate children whose mothers are known. The committee, previous to admitting the child, must be satisfied of the previous good character and present necessity of the mother. The qualification for a governor is a donation of £50. The great Handel was one of the chief benefactors of the hospital. He endowed it with a magnificent organ, and frequently performed his oratorio of the *Messiah* in the chapel, which is still celebrated for its music.

Foundling hospitals exist in Mexico, and in almost all the states of S. America: in the United States foundlings are usually consigned to the county poor farm, but Foundling and Maternity Hospitals exist in the principal cities. Foundling hospitals are said to diminish not only the exposing of children, but also to render infanticide and intentional abortion less frequent. The objection that they contribute to the corruption of morals, if they receive children indiscriminately, and that they encourage parents to rid themselves of responsibility, is the strongest which can be urged against such institutions, and is not easily answered. In Massachusetts foundling hospitals are legally forbidden. In New York city foundlings are sent to Bellevue Hospital, and formerly were transferred to the Infants' Hospital on Randall's Island or in the borough of Brooklyn, to Flatbush. The rate of mortality among them was alarming; in 1897 all children received at the Randall Island institution died before reaching the age of two years, chiefly owing to the change of food and neglect before and exposure during abandonment. At baby farms, private institutions where babies were boarded for gain, the same conditions also prevailed. The attempt to remedy these deplorable conditions has met with great success since 1899. The work is supervised by the Joint Committee on the Care of Motherless Infants under the control of the State Charities Aid Association and the New York Association for Improving the Condition of the Poor, and their annual reports show the rate of mortality has decreased. Foundlings of whose parentage nothing is known are baptized alternately Roman Catholic and Protestant, the Roman Catholic children being in charge of the Guild of the Infant Saviour, while the committee care for the Protestants. In connection with this admirable work is an agency for providing situations in the country for destitute mothers with infants. The *mothering* system has been long enforced in the Chicago Foundling Asylum, and is being adopted in similar institutions throughout the States. Consult: Folks, *Care of Neglected and Dependent Children* (1901); *Reports of the Joint Committee on the Care of Motherless Infants; New York Association for Improving the Condition of the Poor* (1903).

FOUNT, n. *fownt*, or FOUNTAIN, n. *fown'tān* [F. *fontaine*—from mid. L. *fontānă*—from L. *fontĕm*, a spring of water: OF. *funt*, or *font*, a fountain]: a spring of water issuing from the earth; a spring; a well of water; a jet or spouting of water—usually applied to one artificially contrived; the source of anything; in *heraldic emblem*, a ball having wavy stripes of blue and white, like bars. FOUN'TAIN-HEAD, n. primary source; first beginning. FOUNTAIN OF YOUTH, in *myth.*, a fountain, by bathing in which, or, in the opinion of the Hindus, even by seeing it, one can become young again.

FOUNT: in *printing*, same as FONT, which see.

FOUNTAIN, or FOUNT· basin or jet for the supply of

fresh running water. There are fountains of every form and variety, from the simple spring with its natural basin, to the most elaborate and ornamental structure for the display or supply of water. In all ages, fountains have been considered as public monuments of the greatest importance; and where the source for their supply has not been provided by nature on the spot, immense labor and expenditure have often been incurred to make up for the deficiency. In ancient Greece every principal town had public fountains or conduits, some of which were of handsome design and of beautiful execution. The splendid Aqueducts (q.v.) of the Romans are instances of the important light in which they regarded the fountains of their cities. Every Roman town had at least one aqueduct, the water from which was distributed to as many fountains as the population required. Utility is the first object of a fountain, and though they frequently receive forms of great display and magnificence, the finest fountains are those where the water is the greatest ornament. In the middle ages, fountains of great beauty and variety of form were built, but the useful nature of the structure was never lost sight of. Sometimes a spring was arched over for protection, with a beautiful vault, and a statue of the patron saint in a niche, with a basin below to contain the water. In towns where many persons might require to draw at one time, a large basin was erected, with a pillar in the centre, from which pipes radiated all round —each with its separate jet to supply the running water— while the basin was used for washing the pitchers. Many examples of this kind remain. The pillar is sometimes surmounted by a statue, or has one or more smaller basins, with ornamental streams and jets of water falling from tier to tier. A beautiful fountain of this sort was in the royal palace at Linlithgow, Scotland, and a copy of it has been erected in front of Holyrood Palace.

In modern times, the French have excelled in magnificent fountains; the fountains of Paris and of the Tuileries, of the orangery at Versailles, at St. Cloud, and other places in the neighborhood, are splendid structures.

In England, the fountains at Chatsworth (q.v.) and those at the Crystal Palace are among the finest, and are remarkable for the great height to which the water is thrown. Although Rome has lost four-fifths of the aqueducts which so lavishly supplied her with fresh water in the times of the Empire, she is still unsurpassed for the number, beauty, and utility of the public fountains which adorn her streets and places. The principal and most admired fountains at or near Rome are those in front of St. Peter's, of the Villa Aldobrandini at Frascati, of the Termini, of Mount Janiculum, of the gardens of the Belvedere, in the Vatican, of the Villa Borghese, which has also in the audience chamber a splendid fountain of silver, five Roman palms in height, ornamented with superb vases and flowers; the fountains of Trevi, the three fountains of St. Paul, of the Aqua Acetosa, etc.

In the United States the ornamental type of fountain is the one in common use. Large display fountains were attractive features of the Centennial Exhibition, and at the Chicago Worlds' Fair and Buffalo Pan-American Exposition. Among these was the Fountain of the Republic of Chicago, which was designed by MacMonnies, and at Buffalo were costly examples dedicated to Man, Nature, Progress, etc. In Central Park, New York; Fairmount Park, Philadelphia; Lincoln Park, Chicago; Golden Gate Park, San Francisco, and other large parks, will be found numerous fountains of elaborate design. In all the larger cities drinking fountains for men and animals have been erected by individuals and local humane societies. Modern fountains are in most instances entirely ornamental. This arises from the modern mode of distributing water in pipes through the houses, making most street-fountains merely ornamental. Recently it has been found that town populations—both man and beast—require some public supplies of water, and for this service numerous drinking-fountains have been constructed in the principal towns. Many of these are elaborately ornamental, and are gifts of public-spirited citizens.

FOUQUÉ, *fô-kā,'* Friedrich Heinrich Karl, Baron de la Motte: German author: 1777, Feb. 12—1843, Jan. 23; b. Brandenburg; grandson of the Prussian gen. of this name, distinguished in the Seven Years' War. Fouqué served as Prussian officer in the campaigns of 1792 and 1813. The interval was given to literary pursuits in the country, and the rest of his life was spent alternately in Paris and on his estate at Nennhausen, and subsequently at Halle. He died in Berlin. Fouqué appeared first under the name Pellegrin, as translator of Cervantes's *Numancia,* and author of some effusions in the spirit of Spanish poetry. But the Norse legends and old German poetry attracted him most strongly; as was evinced in numerous romances, in prose and verse, which picture the life of medieval Europe. Among the best known are *Sigurd, der Schlangentödter* (1809); *Der Zauberring; Die Fahrten Thiodolf's;* and *Undine.* Exhibiting many of the beauties of the romantic school, he is chargeable with all its extravagances. Straining too often after fantastically unnatural conceits, he seems fascinated by the antique life which he pictures, rather from its quaint contrast with modern manners, than as a form into which the life of actually living men had shaped itself. He edited a selection of his works (*Auserwählte Werke,* 12 Bde., Halle 1841).

FOUQUIERA, n. *fô-kē-ā'ra* [named after Dr. Pierre Eloi *Fouquier,* prof. of medicine, in Paris]: typical genus of *Fouquiereæ,* tribe of *Tamariscaceæ,* distinguished by having large petals united into a tubular corolla. *Fouquiera formosa* is a showy shrub from Mexico, sometimes cultivated in green-houses.

FOUQUIER-TINVILLE, *fô-ke-ā'tăng-vēl',* Antoine

QUENTIN: the notorious public accuser in the French Revolution: 1747–1795, May 7; b. in the village Hérouelles, dept. of Aisne. His early career was immoral, but insignificant. On the outbreak of the Revolution, he figured as one of the fiercest democrats. By Robespierre, he was appointed, first a member, then a director and public accuser, of the Revolutionary Tribunal. Without education, conscience, or sense of justice, he executed with brutal apathy, the bloody orders of the Committee of Public Safety. In reference to this feature of his character, his countrymen say that 'he had no soul—not even that of a tiger, which at least pretends to be pleased with what it devours.' Incapable of friendship, or of anything even remotely allied to generosity, he systematically abandoned his successive coadjutors in their hour of need, and sent to the scaffold, without the slightest compunction, Bailly and Vergniaud, Danton and Hebert, Robespierre and St. Just. He himself died by the guillotine in a cowardly manner.

FOUR, n. a. *fōr* [AS. *feower;* Goth. *fidvor;* Icel. *fjórir;* L. *quatŭŏr*, four]: two and two. FOURSCORE, a. n. *fōr'-skōr* [*four*, and *score*]: four times twenty. FOUR'FOLD, a. *-fōld* [*four*, and *fold*]: four times told; quadruple. FOUR'-TEEN, n. a. *-tēn* [*four*, and *ten*]: four and ten. FOUR'-TEENTH, a. *tēnth*, ordinal of fourteen; the fourth after the tenth. FOURTH, a. *fōrth*, next after the third; ordinal of four. FOURTH'LY ad. *-lĭ*, in the fourth place. FOURS, as in ON ALL-FOURS, that is, 'on the hands and feet'; in the same position; on equal terms. FOUR-COURSE, a rotation by which the same crop is made to recur at intervals of four years. FOUR-SQUARE, having four sides and four equal angles; quadrangular.

FOURCHÉE, a. *fôr-shā'* [F. *fourché*, forked]: in *her.*, a cross forked at the ends.

FOURCHETTE, n. *fôr-shĕt'* [F. a table-fork—from L. *furca*, a fork]: the bone in birds formed by the junction of the clavicles; the furculum; the wishing-bone in a fowl.

FOURCHING, n. *fŭrsh'ĭng* [from Norm. F. *fourche*, to delay, to put off]: in *law*, the act of delaying legal proceedings.

FOURCROY'A: genus of plants of nat. ord. *Amaryllideæ*, nearly allied to Agave (q.v.), but with stamens shorter than the corolla. The species all are tropical; the leaves of some—perhaps of all—yield a fibre similar to the PITA FLAX obtained from those of species of *Agave*.—The name is from Antoine François, Comte de Fourcroy, distinguished Fr. chemist (1755–1809).

FOURDRINIER MACHINE, *fôr-drĭn'ĭ-ā:* paper-making machine, the first to make a continuous web. It was invented by Louis Robert, of Essonne, and patented by him in France. A Mr. Gamble and the brothers Fourdrinier improved it. It was perfected by others.

FOUR EVANGELISTS: four islands in a larger group of islands known as the *Twelve Apostles* off the w. entrance of the Strait of Magellan; about lat. 52° 34′ s., and long.

75° 5′ w. The eight other islands, with which they are classed as above, extend about 15 m. further into the Pacific.

FOUR-EYES: fish: see ANABLEPS.

FOURGON, n. *fôr′gŏng* [F.]: a tumbrel or ammunition-wagon; a French baggage vehicle.

FOURIER, *fô′rĭ-ĕr*, F. *fô-re-ā′*, FRANÇOIS MARIE CHARLES: French Socialist: 1772, Apr. 7—1837, Oct. 8; b. Besançon. His father, a merchant, had him educated in an academy at Besançon, where he distinguished himself by perseverance and success in study, and excelled in geography, mathematics, music, and nat. sciences. He left his studies with regret to enter on the duties of a merchant's clerk, which he performed with zeal and integrity at Lyon, Rouen, Marseille, and Bordeaux. He also travelled in the interest of his employers, in France, Holland, and Germany. In these journeys and residences, nothing escaped his observation; he noted climate, culture, population, public and private edifices, and remembered even the topography of villages, and the dimensions of buildings, with astonishing accuracy. His father died 1781 leaving him about $25,000, which he became possessed of 1793, and invested in trade at Lyon. This was lost in the Revolution; and he was thrown into prison, and compelled to serve two years as a cavalry soldier. Discharged for illness, he obtained employment in a mercantile house at Marseille, where he was employed to superintend the destruction of an immense quantity of rice, held for higher prices, in the midst of a scarcity of food, until it had become unfit for consumption. This called his attention to the frauds and duplicities of commerce, and he gave his spare time to social problems, until he developed the system of Socialism to which his name is commonly given. This system is contained in several works, written and published under discouraging circumstances. In 1808, he published *Théorie des Quatre Mouvements, et des Destinées Générales* (Theory of the Four Movements, and of the General Destinies of the Human Race). In 1822, he produced *Traité d'Association Domestique Agricole* (Treatise on Domestic and Agricultural Association): 1829, *Le Nouveau Monde Industriel et Sociétaire* (The New Industrial and Social World); 1831, *Pièges et Charlatanisme des Deux Sectes Saint-Simon et Owen, promettant l'Association et Progrès* (Snares and Quackeries of the Two Sects of St. Simonians and Owenites, promising Association and Progress); 1835, *La Fausse Industrie Morcelée, Repugnante Mensongère, et l'Antidote, l'Industrie Naturelle, Combinée, Attrayante, Véridique, donnant Quadruple Produit* (False Industry, Fragmentary, Repulsive, and Lying, and the Antidote, a Natural, Combined, Attractive, and Truthful Industry, giving Quadruple Products). These works, written in the midst of commercial pursuits, and published at long intervals by means of his small savings, found for many years few readers, and no disciples. Toward the close of his life, a small

group of intellectual men accepted his views, and gathered round him, to learn from his own lips the details of his social system. He was unwearied in efforts to interest men of power or capital, who could give his theories the test of practical application, and for many of the last years of his life waited patiently at a certain hour every day, expecting to be visited by such a patron. His less patient disciples probably hastened his death by immature and partial efforts at realization. He died in Paris. See FOURIERISM.

FOURIER, JEAN BAPTISTE JOSEPH, Baron: 1768, Mar. 21—1830, May 16: b. Auxerre: French mathematician. He studied at the Polytechnic, and accompanied Gen. Bonaparte to Egypt. On returning to France, he was made préfet of the dept. of Isère 1802, an office which he held till 1815; and was created baron 1808. Shortly after the return of Napoleon from Elba, he resigned all official positions, took up his abode in Paris, and applied himself exclusively to his science. His most famous work is *Théorie Analytique de la Chaleur* (Par. 1822), in which he applies new methods of mathematical investigation. Besides heat he occupied himself with important improvements in the theory of equations; and his speculations and methods in mathematics are of high permanent utility. His work *Analyse des Equations Déterminées*, distinguished for its substance and manner of exposition, left unfinished was published after his death.

FOURIERISM, *fo͝o′rĭ-ėr-ĭzm;* the social system advocated by F. M. C. Fourier (q.v.). It was based on the theory that the social order depends upon fixed moral and intellectual laws, and that man must discover and live according to these laws. According to Fourier society must be so organized as to give freedom to the passions or desires of man, since these are naturally capable of harmony, and, if developed under proper conditions, would, in accordance with the law of attraction, lead to a perfect society. In this society industry should be carried on by phalanxes, each phalanx to be divided into series, and the series combined in groups; each group was to have charge of one kind of work, and each series of one special branch of that work. In the distribution of products a certain minimum was to be assigned to each member of the society, whether capable of labor or not; the remainder to be shared in certain proportions to be previously determined among the three elements, labor, talent, and capital. The capital of the community might be owned in unequal shares by different members of the community; inheritance was to be permitted, and the individuals could expend the remuneration they received as they pleased. The government was to be republican, with elective officers. Fourierism, though socialistic, is not properly socialism, and is related to modern socialism by its sharp criticism of existing conditions, rather than by its plan for the future of society.

Fourierism won many converts in France; among those

who advocated the theory were Victor Considerant and Mennier; an association was formed; a periodical, the *Phalange*, was published for a short time; and a number of communities were organized in accordance with the Fourieristic plan, none of which long survived. Fourierism was introduced into the United States in 1842, by Albert Brisbane, who for a time published *The Phalanx*, in New York. He was welcomed by the members of the Brook Farm community, and the Fourieristic organization was adopted there. For a time the *Brook Farm Phalanx* published *The Harbinger*, the most important periodical published by the Fourierists in the United States. An organization, known as the American Union of Associationists, was formed for the 'popular diffusion of the principles of the associative sciences as discovered by Charles Fourier, with a view to their ultimate realization by the establishment of phalanxes.' Horace Greeley (q.v.) became its president, and George Ripley (q.v.) secretary. A large convention of the 'associationists' was held in New York in 1844. In 1847 *The Harbinger* was transferred to New York under the charge of this association, and was published till 1849. About 34 communities were organized by the Fourierists, of which the most important (besides Brook Farm) were the North American Phalanx, which lived 12 years, and the Wisconsin Phalanx. Most of them existed but a short time, and by 1850 the Fourierist movement had practically come to an end. Consult: Brisbane, *Social Destiny of Man;* Noyes, *History of American Socialisms*; Shaw, *A Forgotten Socialism* (*New England Magazine*, new series Vol. VIII., p. 773). See Brook Farm; Communism; North American Phalanx; Socialism.

FOUR LAKES: chain of connected sheets of water in Wisconsin; fed chiefly by springs. They form, through their outlet, the Catfish, a n.e. source of the Mississippi. They are navigable for steamboats, and drain a beautiful country. Madison, cap. of the state, stands on the strip of land which separates the uppermost of the series from the next in order.

FOURNEAU, n. *fôr'nō* [F. a stove]: in *mil.*, the chamber of a mine in which the powder is placed.

FOURNI ISLANDS, *fôr-nē* (anc. *Corássiæ* or *Córseæ*): group of about 20 small islands in the Grecian Archipelago, between Nicaria and Samos on the e. coast of Asiatic Turkey: the largest is about five m. in circuit.

FOURTH DIMENSION OF SPACE: the space in which we live we recognize as having three dimensions and no more. Any bounded portion of the space has extension in three directions, it has length, breadth, and thickness, and no other extension is conceivable to us. To state the matter in a pregnant form, a point in space is completely determined by three coordinates x, y, z, the perpendicular distances from it to three fixed planes. Every set of values x, y, z corresponds to one point and

vice versa. If z is kept fixed, while x and y vary, the point describes a plane, which is a figure of two dimensions. If y and z are both fixed, and only x varies, the point describes a line, a figure of one dimension. Every equation between x, y, z defines a surface; two simultaneous equations a curve, the intersection of two surfaces; three equations a set of points. The geometric interpretation throws great light on the study of equations, and the latter in turn are of great help in the treatment of geometric properties. Now mathematicians frequently have occasion to study equations involving four or more variables x, y, z, w, . . . , and since the geometric way of looking at the equations is so fruitful, it is natural to retain the geometric phraseology even when the number of variables exceeds three, so that they cannot be represented as coordinates in our space. Thus a system of four variables x, y, z, w defines a fourfold infinity of sets of values which are spoken of in an idealized sense as the 'points' of a four-dimensional space. Whether such a space actually exists as a physical reality is a separate question. It is a mental possibility and possesses a complete mathematical theory as such. It may be said however, that, as we may conceive a being confined to a plane and incapable of perceiving the space which extends on both sides on his own confines, so we may be living in ignorance of great expanses which surround our limited field of experience. More improbable doctrines have often been accepted as religious truths, in the equal absence of certain proof or refutation.

If we could become domiciled in a four-dimensional space, many of its peculiarities would certainly excite our lively attention. Some idea of the changes involved may be obtained by considering the experience of a being confined to a plane if he should become aware of the space extending on both sides of his abode. Originally a circle drawn about him in the plane would shut him in; he could only get outside the circle by penetrating through the circumference. But after his enlightenment he could go around the circle by passing out of the plane, returning to the part of the plane outside the circumference if he so wished. So if we had four dimensions at our disposal, no present enclosure could retain us; stone walls would no longer make a prison, and no bank vault could exclude the sophisticated burglar. A hollow rubber ball could be turned inside out without opening its surface. Two steel rings could be interlaced without cutting either of them. In geometry an angular space of $2\pi^2$ would surround each point, as against 2π and 4π for the plane and ordinary space. As in ordinary space regular solids are formed by laying out triangles, etc., in the plane and then bending them together, so four regular tetrahedra placed against the four faces of another one can be bent together in four-dimensional space until their outer vertices coincide, and the five tetrahedra form a regular body called a tetrahedroid, having 5 vertices, 5 solid faces, 10 plane faces and 10 edges. There are 6 regular

bodies in four-dimensional space, as against 5 in ordinary space. The number of possible dimension of idealized space may be increased indefinitely. The name 'hyper space,' or space of *n* dimensions, is applied to the generalized conception.

There is another point of view, due to Plücker, from which our ordinary space possesses in reality as many dimensions as we choose to assign to it. When we say that it has three dimensions, we simply mean, as pointed out above, that a *point* has three coordinates. But we are not compelled to regard the point as the only element. Space contains lines, for example, as well as points. Now a line in space has *four* coordinates, the line geometry of space involves four variables, and space regarded as made up of lines has four dimensions. Cantor has shown that all the points of space have a one-to-one correspondence with those of a straight line; from this point of view space has only one dimension. The fact is that the ordinary intuitive idea 'dimension' is a very vague notion, which when it comes to vigorous definition, breaks up into an endless number of different notions any one of which may be taken as a basis of reasoning. The number of dimensions of space will then vary according to the choice made.

FOURTH DISEASE—DUKE'S DISEASE: the name given by Dr. Clement Dukes to an acute eruptive disease of childhood which he believed to differ from scarlet fever, measles, and German measles. It resembles German measles except that the eruption is more like that of scarlatina than that of measles. The affection occurs chiefly during warm weather. The symptoms are usually not severe. The first to appear is generally the rash which is of a bright red color, covering the entire body more or less. The mucous membrane of the throat is reddened and swollen, but not painful. The tongue is not noticeably coated, as a rule; the eyes are suffused; the superficial glands are slightly enlarged and moderately harder. The fever is seldom high, though the temperature may exceptionally rise to 103° or 104°, and the pulse is quickened in keeping with the fever. There may be a slight amount of desquamation following the rash, but it is never so marked as is measles or scarlatina. The disease lasts a week or two, but it is mild in character and the patient seldom feels very ill. Children are those usually attacked, though adults are not exempt. Many authorities claim that this is not a distinct disease, but that the cases described as such are instances of mild scarlet fever or of a modified form of German measles.

FOUTRA, n. *fo͞o'trȧ* [Scot. *fouttour;* OE. *fouter*, expression of great contempt: OF. and slang, *foutre*, to have intercourse]: in *OE.*, a term expressive of the utmost contempt; a fig for you.

FOVEA CENTRALIS [Lat.]: central pit or depression. The fovea is a minute depression in the retina of the eye

on the line of the optic axis. It is due to the fact that the nerve fibers and cells of the anterior part of the retina are spread out to allow the light rays to strike directly the sensitive rod and cone layer. As a consequence this part of the retina subserves the most acute vision. The focal point of the field of vision corresponds to this foveal activity. See FIELD OF VISION.

FOVEATE, a. *fō'vē-āt*, or FOVEOLATE, a. *fō'vē-ō-lāt* [L. *fŏvĕă*, a pit]: in *bot.*, having pits or depressions called FOVEÆ, n. plu. *fō'vĕ-ē*, or FO'VEOLÆ, n. plu. *-ō-lē*. FOVEA, n. *fō'vĕ-ă*, the depression containing the sporangium in Lycopods.

FOVILLA, n. *fō-vĭl'lă* [L. *fŏvĕō*, I nourish]: in *bot.*, the viscid protoplasm contained in grains of pollen.

FOWL, n. *fowl* [Goth. *fugls;* Ger. *vogel;* Icel. *fugl*, a fowl: AS. *fugol*, a bird—from AS. *flug*, flight, allied to Lat. root *fug-*, to flee]: a cock or hen; a bird; poultry: V. to take or catch birds for food, or as game. FOWL'ING, imp. N. the act or practice of shooting fowls or birds. FOWLED, pp. *fowld*. FOWL'ER, n. one who takes or kills birds for food. FOWLING-PIECE, a light gun for shooting birds; formerly of wrought iron, now usually of cast steel. Breach-loaders are now favored, though muzzle-loaders are preferred by some sportsmen. FOWLS OF WARREN, birds kept in a preserve. Lord Coke says they are 'the partridge, quail, rail, etc.,' 'pheasant, woodcock, etc.,' and the 'mallard, heron, etc.' Manwood declares that there are only two fowls of warren, the pheasant and the partridge. In England it has been decided that grouse are not birds of warren.

FOWL: originally synonymous with *bird*, and still used in that signification; but usually restricted to that genus of birds (*Gallus*) to which the common domestic fowl (*G. domesticus*) belongs. This genus gives its name to the important order of *Gallinaceous Birds*, called also from their habit of scraping the earth in search of food, *Rasores* (Lat. Scrapers); and is included in the family *Phasianidæ*, with pheasants, tragopans, etc. The general form, and the characters of the bill, feet, etc., agree with those of the pheasants; but the crown of the head is generally naked, and furnished with a fleshy *comb*, the base of the lower mandibles also bearing fleshy lobes or *wattles*, characters most conspicuous in the males; and the tail is very different from that of the pheasants, indeed very singularly formed, being composed of 14 feathers in two nearly vertical planes, or as if a horizontal tail were folded together, so as to make a sharp angle at top, the two middle feathers being the uppermost, and in the males elongated beyond the rest, and gracefully arched. The tail-coverts of the male are also very ample, and the feathers of the back of the head and of the neck are either elongated and loosely webbed, forming the *hackles*, valued by anglers for dressing artificial flies, or are otherwise modified for adornment; characters sometimes exhibited in a very inferior degree in the female

sex also. The legs of the male are armed with spurs, as in the pheasants, of which much use is made in the combats of these birds among themselves, all being very pugnacious. They all are polygamous, and unable to endure the presence of a rival. All are natives of the E. Indies and of the Malayan Archipelago. From what country, and at what period the domestic fowl was introduced into Europe, is uncertain. The remains of Egyptian antiquity carry us back to a period when it was apparently unknown in Egypt, and there is no distinct allusion to it in the Old Testament; but it seems to have been common in the s. of Europe from the earliest ages of European civilization. The cock was sacred to Apollo, to Mercury, to Mars, and to Æsculapius. It was figured on Grecian and Roman coins and gems; it was highly valued for its courage and pugnacity, and the sport of cock fighting was a favorite both with the Greeks and the Romans, as it is among the Chinese, the Malays, and many other nations at the present day, and in former times was among all classes of society even in Britain (see COCK-FIGHTING). The domestic fowl appears to have been known to the ancient Britons before the Roman invasion; and when the South Sea Islands were first visited by Europeans, it was found there in the same domesticated state, and there also cock-fighting was found a favorite amusement of the savage natives. The native country of the domestic fowl is not known, nor is it certain what the species is in its original state. The ancient Greeks sometimes called it the *Persian Bird*, whence it has been supposed a native of Persia; but there is nothing else to support this opinion, and probably this appellation may at most indicate only its introduction into Greece from Persia. The Jungle Fowl of India, first species of *Gallus* known in its wild state to naturalists, was for some time supposed the origin of the domestic fowl, but to this opinion there are strong objections in the very peculiar character of some of the feathers which distinguish the Jungle Fowl, and of which no trace ever appears in the domestic fowl. More recently, the Bankiva Fowl and other species have been discovered in Java and other islands of the Eastern Archipelago, more nearly resembling the domestic fowl, and the distribution of the latter through the islands of the Pacific Ocean is favorable to the belief that it derived its origin from that region; still the identification of the species remains difficult, and some naturalists incline to the opinion that the domestic fowl may be derived from intermixture of distinct wild races.

The BANKIVA FOWL (*G. Bankiva*), native of Java, is extremely similar to some domestic varieties; indeed, Sir William Jardine says: 'Many Bantams so nearly resemble this bird, that there would be great difficulty in making a distinction. The comb is large and lobed, or dentelated; the colors are brilliant, steel-blue and chestnut, black and yellowish brown, the hackles abundant and golden orange; some parts of the plumage exhibiting a very fine play of colors. A very similar species, or a variety of the same,

but rather larger, is found in some parts of continental India.' Very similar also is the BRONZED FOWL (*G. œneus*), found in Sumatra, resplendent in metallic green, purple, and lake; but of which the comb has the upper margin unbroken: the wattles are combined into one attached to the centre of the throat; and the neck feathers do not assume the *hackle* character, which appears in the neighborhood of the tail alone. These peculiarities belong also to the FORK-TAILED FOWL (*G. furcatus* or *Javanicus*), a species abundant in the jungles of Java, and often seen on their outskirts, nearly two ft. in length from the tip of the bill to the extremity of the tail. A still larger species—if, indeed, these are not rather varieties than species—is the GIGANTIC FOWL, JAGO FOWL, or KULM FOWL (*G. giganteus*) of Sumatra, with double wattle under the throat, abundant hackles on the head, neck, and upper part of the back, green and reddish yellow the principal colors, and the height considerably more than two ft. The JUNGLE FOWL (*G. Sonneratii*), abundant in the higher wooded districts of India, where it is much sought by European sportsmen, is about equal in size to an ordinary domestic fowl, but is more slender and graceful in its form; the comb of the male is large, and its margin broken; the colors are rich and beautiful; but a remarkable peculiarity is in the hackle feathers, which are terminated by flat horny plates of a golden orange color, into which the shaft expands, or the shaft thickening and terminating abruptly gives rise to a battledore-like stem and disk, in substance like the tips of some of the feathers of the wax-wing.

The Domestic fowl is kept principally for its eggs and flesh. Its feathers are of some value, it is useful for destroying various insect pests, and some breeds are kept for ornament. It is almost invariably kept in considerable numbers on farms, and in the vicinity of towns and cities many people make its rearing and care their sole occupation. It is claimed that the annual value of the eggs and flesh of the domestic fowl sold in this country exceeds that of any other live stock or any agricultural product.

No special effort to improve the quality or increase the productiveness of the domestic fowl was made either in this country or Great Britain until about 1825 and it was not until about 20 years later that any degree of enthusiasm was aroused. In 1845 the Cochin China breed, which had recently been introduced, became immensely popular in England. Prices were almost fabulous. Cocks were readily sold for a hundred guineas each. About the same time interest was awakened in this country. Importations from China were made in 1847 or 48, and in the latter year a poultry show was held in New York. The interest soon became a kind of mania, and the 'hen fever' raged for years. Immense prices were paid for stock, and eggs of certain breeds were almost as valuable as gold. Many foreign breeds have been imported, native fowls have been improved by selection and crossing, and new and valuable breeds have been formed. A number of papers solely in this interest

are published and widely circulated; many books on fowls have been published; the exhibition of fowls is a prominent feature of agricultural fairs, while a large number of societies of poultry raisers hold annual meetings.

The early importations of foreign fowls were confined to the large Asiatic breeds. About 1850 the Brahma was introduced. This was followed by the Shanghai some five years later. Since that time other large breeds have been brought from Asia, while many smaller, principally from s. Europe, have been introduced and become popular.

The following are among the more important classes and breeds of the domestic fowl now popular in this country. Of the large Asiatic breeds the Brahma is one of the most desirable. The fowls are large, hardy, grow rapidly, are excellent layers, especially in winter, are very quiet and not inclined to scratch or roam. The principal objections are the rather long time required in which to arrive at maturity, and a tendency, unless carefully fed, to take on flesh at the expense of the laying qualities. Among the other valuable breeds of this class, and with the same general characteristics, are the Cochins, of which the Buff, Black, White, and Partridge are the most popular representatives; and the Langshans, introduced here from n. China about 1876. Among the smaller Asiatic fowls the Games, of which there are many varieties, are noted for their fierce and quarrelsome disposition, for the excellence of their flesh, and for their fine laying qualities. The Bantams are diminutive in size, are layers, and make pleasing pets. The Game and the Golden Sebright are among the best varieties. Of European breeds, the Dorking is one of the oldest and best. It was undoubtedly kept by the ancient Romans, has long been one of the most popular fowls in England, and is a favorite wherever kept. It grows to a large size, the flesh is of the finest quality, it matures early, and is a moderately good layer. Is very quiet and beautiful, and if purely bred has five toes on each foot. The White, Colored, and Silver-Gray are among the best varieties. The Houdans, introduced from France, are the most popular of the several breeds from that country. They are of good size, hardy, good layers, particularly in winter, do not incline to sit, bear confinement well, and are excellent for the table. Of the Spanish fowls the breed known as the Black Spanish is the principal one kept in this country. Their flesh is good and they are excellent layers, but require a warm place in winter. The Polish fowls, of which the White-Crested Black Polish, the Bearded Golden Polish, and the Bearded Silver Polish, are among the best, are good layers, non-sitters, are of medium size, bear confinement well, and are easily fattened. The Leghorns, of which the White and Brown are the most popular, are extremely valuable for egg-production. They are small, seldom sit, are inclined to roam, and are not desirable for the table. The Hamburgs also are small, good layers, non-sitters, apt to wander, and inferior for the table; they are prized for their appearance.

The Golden-Spangled and the Silver-Pencilled are among leading varieties. Of American breeds the Plymouth Rock is large, grows rapidly, matures early, is excellent for the table and for egg-production, and is hardy and vigorous; the American Sebright is of good size and valuable for both flesh and eggs; and the Black Java, originated in Missouri about 1848, is large, hardy, a good layer, and excellent for the table. The Wyandotte is a comparatively new breed resembling the Plymouth Rock. A large proportion of the domestic fowls kept on farms are crosses of various varieties and are inferior to those which have been more carefully bred. Immense numbers of eggs are now hatched by artificial means [see INCUBATION], which proves an important aid, especially when the non-sitting breeds are kept. For management of the domestic fowl in health and disease, see POULTRY.

FOWLER, *fow'lėr*, CHARLES HENRY, D.D., LL.D.: Bp. of the Meth. Episc. Church: b. Burford, Canada, 1837, Aug. 11. He removed with his parents to Ill. 1841, spent several years on his father's farm, graduated at Genesee College, Lima, N. Y., 1859, and at the Garrett Biblical Institute, Evanston, Ill., 1861; entered the ministry of the Meth. Episc. Church 1861, and preached in Chicago till 1872, when he was elected pres. of Northwestern Univ. He resigned this office on being elected editor of the New York *Christian Advocate* 1876; in 1880 he was elected a cor. sec. of the missionary soc., and 1884 bp. He was a member of the gen. conferences of 1872, 76, 80, 84, and received the degree D.D., from Northwestern Univ., and LL.D., from Syracuse University.

FOWLER, ELLEN THORNEYCROFT, English novelist. She is the daughter of Sir Henry Fowler, secretary of state for India 1894–5. Her published works include: *Verses Grave and Gay* (1891); *Verses Wise and Otherwise* (1895); *Concerning Isabel Carnaby* (1898); *A Double Thread* (1899); *The Farringdons* (1900); *Love's Argument* (1900); *Sirius, and Other Stories* (1901); *Fuel of Fire* (1902).

FOWLER, FRANK, American artist: b. Brooklyn, N. Y., 1852, July 12. He studied at Florence as pupil of Edwin White, at Paris with Carolus Duran and in the Beaux-Arts, established a studio at New York in 1880, and became known as a portrait painter. His subjects include S. J. Tilden, Archbishop Corrigan, C. A. Dana, and other notabilities. He was elected a National Academician, and has published manuals of art: *Oil Painting; Drawing in Charcoal and Crayon; Portrait and Figure Painting.*

FOWLER, Sir JOHN, English civil engineer: b. near Sheffield 1817; d. London 1898, Nov. 20. In 1844 he was appointed to superintend the construction of the Manchester, Sheffield, and Lincolnshire system, a connected group of railways, and other works of vast extent and complexity. He subsequently was employed on many civil engineering works both in England and elsewhere;

but the work with which his name will probably be most lastingly connected is the great bridge across the Forth, of which he was chief engineer, having as his colleague Sir Benjamin Baker. On its completion in 1890 he was made a baronet.

FOWLER, Joseph S., American lawyer: b. Steubenville, Ohio, 1820, Aug. 31; d. 1902. He became professor of mathematics at Franklin College, Tenn., and was president of the Howard Female College in Gallatin, Tenn., in 1856–61. Subsequently he was State comptroller under Andrew Johnson, and was a United States senator 1866–71. In 1871 he retired from political life and engaged in law practice in Washington, D. C.

FOWLER, Lorenzo Niles, American phrenologist: b. 1811; d. 1896. He was a brother of Orson Squire Fowler (q.v.). From 1863 he resided in England. He was a publisher of the *Science of Health* (originally the *Water-Cure Journal*) and the *American Phrenological Journal*, and wrote *Phrenology and Physiology* (1844).

FOWLER, Orson Squire; 1809, Oct. 11—1887, Aug. 18; b. Cohocton, Steuben co., N. Y.: phrenologist. He graduated at Amherst College 1834, with his brother Lorenzo Niles Fowler (b. 1811, June 23), established an office in New York 1835, began lecturing on phrenology and editing and publishing books and periodicals on the subject 1836, removed to Boston 1863, and to Manchester, Mass., 1875; and continued his labor as author till shortly before his death. His numerous works include: *Memory and Intellectual Improvement* (1841); *Physiology, Animal and Mental* (1842); *Matrimony: or Phrenology applied to the Selection of Companions* (1842); *Self-Culture and Perfection of Character* (1843); *Hereditary Descent, its Laws and Facts applied to Human Improvement* (1843); *Love and Parentage* (1844); *The Self-Instructor in Phrenology and Physiology* (1849); *Sexual Science* (1870); *Amativeness; Human Science*; and *Creative Science*.

FOWLER, Thomas, English philosopher: b. Burton-Stather, Lincolnshire, 1832, Sept. 1. He was educated at Merton College, Oxford, and from 1873 to 1889 was professor of logic in the university. Since 1881 he has been president of Corpus Christi College. His published works include: *Elements of Deductive Logic* (1867; 10th ed. 1892); *Elements of Inductive Logic* (1870; 6th ed. 1892); an edition of Bacon's *Novum Organum* with introduction and notes (1878; 2d ed. 1889); a little work on *Locke* (1880); an edition of Locke's *Essay on the Conduct of the Understanding* (1881; 3d ed. 1890); *Francis Bacon* (1881); *Shaftesbury* (1882); *Hutcheson* (1882); *Progressive Morality: an Essay in Ethics* (1884; 2d ed. 1895); *History of Corpus Christi College, Oxford* (1893); *Principles of Morals* (Part I., introduction written with J. M. Wilson, 1885; Part II., the body of the work, by Prof. Fowler alone, 1887; both in one volume, revised 1894); and *Popular History of Corpus Christi College* (1898).

FOWLER, William Warde, English ornithologist: b. Somerset 1847. He was educated at Marlborough College and Oxford, and has been sub-rector of Lincoln College, Oxford, from 1884. He has published: *A Year With the Birds* (1886); *Tales of the Birds* (1888); *Life of Julius Cæsar* (1892); *The City-State of the Greeks and Romans* (1893); *Summer Studies of Birds and Books* (1895); *The Roman Festivals of the Republican Period* (1899); *More Tales of the Birds* (1902).

FOWLER, William Worthington, American author: b. Middlebury, Vt., 1833, June 24; d. Durham, Conn., 1881, Sept. 18. He was the author of *Ten Years in Wall Street* (1870); *Fighting Fire* (1873); *Woman on the American Frontier* (1877); *Twenty Years of Inside Life in Wall Street* (1880).

FOWLERITE, n. *fow'lėr-īt* [named after *Fowler*, who mentioned it in the *American Journal of Science* 1825]: zinciferous variety rhodonite. It occurs at Franklin, New Jersey. It is called by Thomson ferrosilicate of manganese.

FOWL'ER'S SOLUTION. See Arsenic.

FOWL'ING: killing or taking of birds for their flesh, feathers, etc.; variously practiced in different parts of the world. In some places where the people depend on it for their subsistence, it is prosecuted with great toil and danger; elsewhere it is an expensive recreation. Nets are much used in the capture of many kinds of birds, particularly small birds intended for the table: bird-lime is used for the taking of great numbers near their drinking-places; gins, springes, and traps of various kinds also are employed. The numerous kinds of ducks, geese, and other *Anatidæ*, are, in an economical point of view, among the most important of birds, and the methods of their capture are various and interesting. See Wild-fowl.

Of all kinds of fowling, *Rock-fowling*, on which the inhabitants of many northern coasts and islands in a great measure depend for their means of subsistence, is far the most adventurous. The objects of pursuit are gannets or solan geese, gulls, terns, guillemots, and other sea-birds, which frequent the most lofty precipices, and breed on their shelves and ledges. The flesh, even of the best of them, is generally coarse, and of a fishy taste, yet both fresh, and salted for winter provisions, it forms great part of the food of the poor people. The flesh of the young is more tender and pleasant than that of adult birds. The eggs of some species are sought by the same perilous means as the birds themselves. The feathers and oil are articles of commerce. The people of St. Kilda pay part of their rent in feathers and fulmar oil, the rocks being apportioned among the inhabitants as exactly as its soil. Almost every man in the island is a cragsman or rock-fowler, which is nearly the case also in many other northern isles of Britain. The multitudes of sea-fowl around many of the rocky northern coasts is prodigious, resembling at a distance—as may be

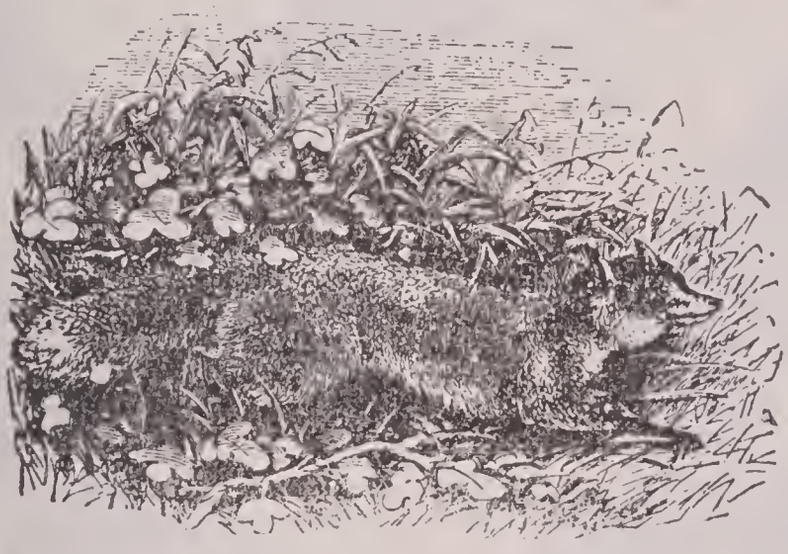
seen at the Bass Rock in the Firth of Forth—the bees around a busy hive. Uninhabited islets are annually visited by fowlers, as Borrera by the people of St. Kilda; and the 'stacks,' or high insular rocks near the shore, are often extremely productive. These are, of course, reached by boats: and while landing is often difficult and dangerous, the climbing of the precipice is still more so. The Norwegian fowlers, or 'bird-men,' carry on such expeditions with a *bird-pole* or *fowling-staff*, about five or six yards long, and a rope of several fathoms. The bird-pole has an iron hook at one end; it has also a flat head; and by means of it the fowler is pushed and guided by his comrades below as he ascends a very steep or precipitous cliff; by means of it, also, he strikes down or draws in birds. The rope is used to fasten two fowlers together, being attached to the waist of each: they aid one another in climbing, pushing, and drawing one another up the rocks, the safety of the one often depending on the strength and courage of the other. The bird-pole is used also with a small net attached in the capture of birds flying around. The Norwegian fowlers sometimes remain for days on ledges where birds are abundant, sleeping in holes or clefts, and having food let down to them by rope from above.

Still more perilous, if possible, is the mode of fowling practiced where the precipices cannot be scaled. The fowler is let down by a rope, and hangs in mid-air, often at an elevation of several hundred ft., above rough rocks or roaring waves; and by means of his feet or of a pole throws himself out to such a distance from the face of the rock as to obtain a view of all its ledges and crannies, to which, with astonishing coolness and dexterity, he directs his course, often also catching the birds that fly near him in the air. A second rope is for giving signals, and for sending up birds when captured. The principal rope used to be made of twisted raw cow-hide; it was so durable as to last for two generations, and was bequeathed as valuable property by father to son. Manilla hemp is now chiefly used instead. The practice differs also as to the number of comrades holding the rope above. In the Faroe Isles, where some of the precipices are 1,400 ft. in height, the rope is usually held by a number of men. In some of the Scottish islands, fowlers have been adventurous enough to descend the cliffs unaided, fastening the rope for themselves to a stake driven into the ground above. It is not unusual for the fowler to disengage himself from the rope while he pursues his labors but when the precipice overhangs above, he is exposed to a great danger of the rope's escaping from his reach.

FOWL MEADOW GRASS (*Poa serotina*): one of the most valuable varieties of grass for moist land: known in some localities as False Redtop. It is common in the northern portions of the United States and Canada; also largely grown in Europe. The roots are slightly creeping. The flowered spikelets, which appear in July and August, are green with a purple tinge.

FOX, n. *fŏks* [Goth. *fauho;* Ger. *fuchs;* Icel. *fox* or *fóa*, a fox]: an animal of the dog kind noted for its cunning; a sly cunning fellow; in *OE.*, a cant term for a sword. **Fox-bats**, the very large fruit-eating bats of E. Indies. **Fox-brush**, the tail of a fox—usually called *the brush*. **Fox-grape**, *Vitis vulpina*, so called because its fruit has a foxy taste; native of N America, where it is cultivated. **Fox-hound**, a hound for hunting the fox; not quite so large as the staghound, and perhaps a mixed breed between the staghound or the bloodhound and the greyhound. The color is commonly white, with large patches of black and tan color. Their speed and perseverance are remarkable; they have been known 'to run hard for ten hours before they came up with and killed the fox, and the sportsmen were either thrown out, or changed horses three times. **Fox-hunt**, the chase or hunting of the fox (see **Fox-hunting**). **Fox'ship**, n. the qualities of a fox; cunning. **Fox'y**, a. *-ĭ*, having the color of a fox. **Foxlike**, a. resembling the cunning of a fox.

FOX (*Vulpes*): genus of *Canidæ* (q.v.), particularly distinguished from dogs, wolves, jackals, etc., by the pupils of the eyes contracting vertically, and in the form of the section of a lens, not circularly. This takes place whenever the eyes are turned to a strong light, and all foxes



The Common Fox (*Vulpes vulgaris*).

are nocturnal animals. Foxes generally are also of lower stature in proportion to their length than the other *Canidæ:* they have a roundish head, with a very pointed muzzle, short triangular ears, slender limbs, and a bushy tail They dig burrows for themselves in the earth, or take possession of holes already existing. They are famous for their cunning, which is seen both in their artifices for obtaining prey, and for escaping from danger. They feed on small quadrupeds, birds, eggs, etc.; some of them also partly on fruits and other vegetable substances.—The **Common Fox** (*V. vulgaris*), native of most parts of Europe, is the only British species, and is still abundant in many parts of the country, though from many parts it would probably have been extirpated ere now, unless it had been

in some measure protected with a view to the sport of fox-hunting. The common fox is reddish brown above, white beneath; the outside of the ears black, a black line extending from the inner angle of the eye to the mouth; the legs mostly black, the end of the tail generally white, though specimens sometimes occur in which it is gray, or even black. The *Greyhound Fox* is a variety more slender and longer-limbed. The *Cur Fox*—frequent in upland moorish districts—is smaller than the common variety. There are other varieties. The fox has a gland under the tail, which secretes a very fetid substance, communicating to the whole animal its well-known smell. It breeds once in a year, having usually four, five, or six young ones in a litter. Its usual voice is a kind of yelp. Its senses of sight, hearing, and smelling are very acute. Innumerable anecdotes are on record illustrative of its cunning. The difficulty of setting traps so that they shall not be detected and avoided by it, is well known. Foxes are said to have been observed approaching water-fowl by swimming slowly with a turf in the mouth, so as to remain concealed. A most trustworty person affirms, that he saw a fox approach a group of hares feeding in a field, with a slow, limping motion, and having his head down as if eating clover, till he was near enough, by a sudden rush, to secure very different food. Foxes captured in hen-roosts have often been known to simulate death, and to submit to being dragged about and very roughly treated without a sign of life, till an opportunity of escape presented itself. When they are driven to their holes, and these are surrounded with traps, they frequently show such appreciation of the danger, that they will endure starvation for days and even weeks rather than come out. Even when taken young, the common fox can hardly be tamed; and very few instances are on record of its showing even a little of that attachment to man of which so many animals are capable, and for which the dog is remarkable. For improbability of any of the domestic races of dog being at all derived from the fox, see Dog. The French *renard* appears in English in *reynard*, the familiar appellation of the fox.—The south of Europe produces foxes of smaller size than the common fox, having the fur of the belly black, regarded by some as a mere variety, by others as a distinct species (*V. melanogaster*). They are less carnivorous, and to them some of the allusions and fables relate—as of the fox and grapes, etc.—which do not accord well with the habits of the foxes of n. Europe.—The Himalaya Mountains produce a species (*V. Himalaicus*) very similar to the common fox, but of superior size and brilliancy of colors. The fur is rich and fine.—The Black Fox of n. Asia is very similar to the common fox, but entirely of a velvety black color, except the tip of the tail, which is white; its fur is greatly esteemed, brings a high price, and is an article of export from Kamtchatka to China.—The Coal Fox (*V. alopex*) of some parts of Europe, as Switzerland and Bavaria, is by some naturalists regarded as distinct from the common fox. It is of inferior size, more timid, and less troublesome; the

1. Cape Fox or Lalande's Dog. 2. Arctic Fox. 3. Side-Striped Jackal or Quaha. 4. Silver Fox. 5. Corsac.

tip of the tail is black.—North America has several species of fox, of which the Red Fox (*V. fulvus*) very nearly resembles the common fox of Europe, but is of rather larger size, has a shorter muzzle, eyes nearer each other, and a more copiously bushy tail. Its fur is also longer, finer, more brilliantly colored, and much more valuable, forming a considerable article of export from the fur countries; in which, as well as in Canada, and in the northern parts of the United States, this species is abundant. The Cross Fox is a variety of it, distinguished by a longitudinal dark band along the back, crossed by a transverse band over the shoulders. The burrow of this fox 'at first inclines downward for four or five feet at an angle of about 25 degrees, it then inclines upward a little, which is a security against inundations, and is continued at a depth of about three or four ft. from the surface, until it reaches a point where it is divided into two or three galleries.' Great numbers of these foxes are annually tracked to their burrows, and digged or smoked out of them by American farmers.—The Gray Fox (*V. Virginianus*) is the most abundant species of the southern states, extending, however, as far n. as Canada, where it is rare. It is of gray color, varied with black, is about the size of the common fox, but not so bold, and sometimes eats vegetable substances, such as ears of maize. The gray fox exhibits not a little of that cunning for which the common fox is celebrated, and when pursued by hunters and hounds, has been known to escape by getting upon the rail of a fence and running along it for some distance, so that the scent was lost. This was on one occasion done on the newly-laid rail of a railroad elevated above a swamp. It is not unfrequent for the gray fox, when hard pressed, to take refuge in a tree, particularly if one which has somewhat fallen from the perpendicular presents itself.—There are a number of other species of fox, Asiatic, African, and American; but the most deserving of notice is the Arctic Fox (*V. lagopus*), which inhabits the most northern parts of Europe, Asia, and America. It is very plentiful in Iceland, feeding much on ptarmigans, and sometimes on young lambs. Great numbers are found on the shores of Hudson's Bay, particularly during winter, and they have been supposed to migrate thither from still more northern regions; but it has been ascertained that this animal spends the winter even in the most northern regions that have ever been visited by man, braving the cold of Melville Island and Bank's Land, and finding abundance of food in the hares, marmots, ptarmigans, and other animals which also remain there. The Arctic Fox is rather smaller than the common fox; it is more densely clothed with a woolly fur, which on some parts is two inches in length; the tail is extremely bushy; and even the soles of the feet are thickly covered with hair. The color is pure white in winter, at least in very cold climates; varying to a brownish or bluish color in summer. It is gregarious, and many burrows are often found together. It is extremely cleanly in its habits, and is quite devoid of the offensive smell which belongs to

most of the foxes; it is also much less cunning, and much more easily trapped, as well as much more gentle and capable of being tamed. Its flesh has been sometimes eaten by arctic voyagers, with a relish due to the extreme cold of the climate, and the consequent demand of the system for animal food. Its fur is not nearly equal in value to that of the red fox.

FOX, Charles James: English whig statesman: 1749 (N.S.), Jan 24—1806, Sep. 13; second son of Henry Fox, first Lord Holland, by Lady Georgiana Carolina, eldest daughter of the Duke of Richmond. He was educated at Eton and Oxford, spending his vacations on the continent in the gayest and wittiest circles of the French capital, and visiting Switzerland and Italy. Notwithstanding the irregular life which he led even as a school-boy, he was distinguished for ability at school and college; and so high was his father's opinion of his talents, that at the age of 19 he had him brought into parliament as member for the borough of Midhurst, a step to which he is said to have been further incited by the fact, that, even at this early age, Fox's energies had found an outlet in gambling and various other forms of dissipation. His precocity in vice, as well as in intellectual development, is said to have been the result of the injudicious fondness of his unprincipled but gifted father. Till he attained his majority, Fox prudently kept silent in the House, but immediately thereafter he appeared as a supporter of the administration of Lord North, and was rewarded with the office of one of the lords of the admiralty. In 1772, he resigned that office, and the following year was named a commissioner of the treasury. From that post he was dismissed, in consequence of a quarrel with Lord North, and passed over to the ranks of the opposition. During the whole course of the American war, he was the most formidable opponent of the coercive measures adopted by the government, and the most powerful advocate of the claims of the colonists; acting, to this extent at least, in accordance with the views which for many years before had been urged upon the country by the great Lord Chatham, the father of his future rival, Mr. Pitt. The difference between them was, that whereas Lord Chatham urged conciliation, in order to preserve the connection between the two countries, Fox foresaw and foretold the necessity and the advantages of complete separation. In 1782, on the downfall of Lord North, Fox was appointed one of the secretaries of state, which office he held till the death of the Marquis of Rockingham, when he was succeeded by the Earl of Shelburne, afterward Marquis of Lansdowne. On the dissolution of the Shelburne administration, the North and Fox coalition was formed, and Fox resumed his former office; but the rejection of his India Bill by the house of lords soon led to the resignation of his government. It was now that Mr. Pitt came into power, and that the long and famous contest between him and Fox, who occupied the position of leader of the opposition, commenced. In 1788, he took a short respite from

his public labors. Accompanied by his wife, he visited the continent, and having spent a few days at Lausanne, in the company of Gibbon, who was there engaged in writing his famous history, he set out for Italy. The sudden illness of the king, however, and the necessity of constituting a regency, rendered it undesirable that he should be longer absent from England, and he hastened back to his post. The regency, the trial of Warren Hastings, the French Revolution, and the events which followed it, gave ample scope to the talents and energies of Fox, and on all occasions he employed his influence to modify, if not to counteract, the policy of his great rival. He was a strenuous opponent of the war with France, and an advocate of those non-intervention views which find greater favor in our day than they did in his. After the death of Pitt, Fox was recalled to office, and endeavored to realize his doctrines by setting on foot negotiations for a peace with France, the results of which he did not live to witness. In private life, Mr. Fox was a genial companion, kindly and sincere in the closer relations of friendship, while his conduct to those to whom he was opposed in public was generous, and free from every trace of malignity or enmity. Lord John Russell, in the preface to his *Memorials and Correspondence*, speaks of the singular candor, boldness, simplicity, and kindness of his character; and of his oratorical powers it is enough to record, that Burke called him 'the greatest debater the world ever saw,' and Sir James Mackintosh 'the most Demosthenian speaker since Demosthenes.' His remains were interred in Westminster Abbey, so near those of Pitt, as to suggest to Sir Walter Scott the couplet—

> "Shed upon Fox's grave the tear,
> 'Twill trickle to his rival's bier."

See, besides the *Life and Times* and the *Memorials and Correspondence*, by Earl (then Lord John) Russell, the *Character of the late C. J. Fox*, by Dr. Parr (1809), and the interesting *Early History of C. J. Fox*, by G. O. Trevelyan (1880).

FOX, George: originator of the Society of Friends (q.v.), commonly called Quakers; 1624–1691, Jan. 13; b. Drayton, Leicestershire, England. At an early age he was employed in keeping sheep; then was apprenticed to a country shoemaker; but when about 19 years of age, his religious impressions produced such a strong conviction in him, that he believed himself the subject of a special Divine call; and abandoning his usual avocations, wandered solitarily through the country, dressed merely in a leathern doublet of his own making, and absorbed in spiritual reveries. After some time, his friends induced him to return home, but Fox stayed with them for only a short period, and finally adopted the career of an itinerant religious reformer. About 1646, he left off attending church for divine worship, but did not scruple to interrupt the services when conducted by 'professors,' i.e., formalists, or persons whom he believed not to be genuine Christians.

His first efforts at proselytism were made at Manchester 1648. The excitement caused was very great, and, in consequence, Fox was imprisoned for some time as a disturber of the peace. His leading doctrines or convictions were: the futility of learning for the work of the ministry, the presence of Christ in the heart as the 'inner light' superseding all other lights, and the necessity of trying men's opinions and religions by the Holy Spirit and not by the Scriptures. Fox next travelled through various midland counties, Derby, Leicester, and Northampton, exhorting the people in public places to forsake all vicious practices, drunkenness, swearing, etc., and to cultivate the Christian graces. He had a winning manner, and by his extreme earnestness made many converts. His followers were first contemptuously called 'Quakers' in 1650. According to Fox's own account, given in his *Journal*, 'This was Justice Bennet of Derby, who was the first that called us Quakers, because I bade them tremble at the word of the Lord.' The name has been commonly explained from the Quakers' agitation when 'moved by the Holy Spirit.' In 1655 Fox was brought to London, and examined before Cromwell, who quickly saw that there was nothing in Quakerism to excite his apprehensions, and pronounced the doctrines and the character of its founder irreproachable. Nevertheless, for some years after this Fox had a hard struggle with his Puritan antagonists. In an age of dogmatism and fanaticism, it was not to be expected that the half mystical spiritualities and grotesque practical crotchets of the Leicestershire shoemaker could meet with any official toleration. Fox was constantly vilified and frequently imprisoned by country magistrates. In 1669, he married the widow of Judge Fell. He then went to America, where he spent two years in propagating his views with much success. On his return to England 1673, he was imprisoned for some time in Worcester jail, under the charge of having 'held a meeting from all parts of the nation for terrifying the king's subjects.' On his release, he visited Holland, and afterward Hamburg, Holstein, and Danzig, always endeavoring to pursuade men to listen to the voice of Christ within them. He died in London. Fox was not a man of broad and philosophic genius; he did not enrich the world with the multitude of his thoughts; in fact, there is a conspicuous poverty of intellect and sentiment manifested in his writings, but (as often happens in the case of a mystic) the earnestness and clearness with which, in the opinion of many, one great truth of Christianity was believed and urged, imparted an efficacy to his words that genius itself might envy. His doctrine of the universal 'inner light'—defended in a more learned fashion by Barclay (q.v.) in *Apology for the Quakers*—may be regarded as a protest against the narrow or at least excessive 'Scripturalism' of his age, but his understanding was not sufficiently clear and strong to guide him safely in all the consequences which he ventured to deduce from it. Hence have sprung most of the *niaiseries* of Quakerism. His writings were

collected and published in 3 vols. 1664–1706. An edition in 8 vols. has been published at Philadelphia.—Compare Sewel's *History of the Quakers;* Neal's *Puritans;* Marsh's *Life of Fox* (1848); and Lives by Janney (Phila. 1853), Watson (Lond. 1860), etc.

FOX, Gustavus Vasa, American naval officer: b. Saugus, Mass., 1821, June 13; d. New York 1883, Oct. 29. He was appointed to the United States navy in 1838, in which he served till 1856, when he resigned with the rank of lieutenant. He was subsequently appointed assistant secretary of the navy, and held this post till the end of the Civil War. He planned a number of operations for the navy, including the capture of New Orleans; and was sent by the government on the Monitor Miantonomoh to convey the congratulations of Congress to Alexander II., on his escape from assassination. His visit to Russia materially aided the acquisition of Alaska by the United States, and was the longest voyage then made in a monitor.

FOX, John William, American novelist: b. Bourbon County, Ky., 1863. He was graduated from Harvard 1883 and has published: *Hell for Sartain and Other Stories* (1897); *A Mountain Europa* (1899); *The Kentuckians* (1898); *Crittenden* (1900); *Blue Grass and Rhododendron* (1901); *The Little Shepherd of Kingdom Come* (1903).

FOX, Margaret, American spiritualist: b. Bath, Canada, 1836; d. Brooklyn, N. Y., 1893, March 8. She was about 12 years old when her family were startled by mysterious rappings. All endeavors to trace them to any physical source proved unavailing. Various experiments were tried, but the 'occult' power refused to act save in the presence of Margaret and her sister Leah. The family moved to Rochester, N. Y., but the raps followed and heavy bodies were moved without appreciable agency. In 1849 the sisters appeared in a public hall, when the same phenomena were freely manifested and tested. In 1850 the two girls went to New York, the 'manifestations' became the subject of public discussion and 'mediums' sprang up all over the country. In 1888 Margaret made a public exposure of her pretended 'manifestations,' which she subsequently contradicted.

FOX, William Freeman, American forester: b. Ballston Spa, N. Y., 1840, Jan. 11. He was graduated at Union College in 1860; studied engineering; served in the Civil War; and subsequently took charge of the Department of Forestry of New York State. He is the author of: *Regimental Losses in the Civil War; The Adirondack Spruce; State Forestry Reports* for 1885–1901; *Forest Tree Nurseries and Nursery Methods in Europe* (1905); and magazine articles on Forestry, etc.

FOX, William Johnson, orator and political writer: 1786–1864; son of a small Suffolk farmer, afterward a weaver at Norwich, England. He gave early promise of talent, and was sent to Homerton College, to be trained for the Congregational ministry. He subsequently seceded to

Unitarianism, but ultimately shaking off all allegiance to existing Christian churches, he delivered a series of prelections at his chapel in South Place, Finsbury, London, which marked him out as the leader and organ of English rationalism. When the Anti-corn-law League enlisted the ablest platform orators of the day in the service of free trade, his bold and impassioned rhetoric greatly contributed to arouse and intensify public feeling. M. Guizot quotes his speeches as the most finished examples of oratory which the great conflict produced. Their effect upon the vast metropolitan audiences to which they were addressed was electric. Fox also contributed by his pen to the success of free trade, and his *Letters of a Norwich Weaver Boy* were largely quoted and read. After the abolition of the Corn Laws, he was invited to stand for Oldham, which borough he represented in parliament 1847–63. Like most men who enter the house of commons late in life, Fox did not altogether realize the oratorical promise of his platform and pulpit career. His best parliamentary speeches were on the education of the people. As a politician he was ever a consistent member of the advanced liberal party. A succession of illnesses in his late years interfered with his attendance in parliament. He was among the earliest contributors to the *Westminster Review*, edited for many years the *Monthly Repository*, and largely contributed to various other organs of public opinion. His *Lectures, chiefly addressed to the Working-Classes*, were published in 3 vols. He was author of a philosophical dissertation on *Religious Ideas*, and other theological works.

FOX, Williams Carlton: American diplomatist: b. St. Louis, Mo., 1855, May 20. He first came into prominence as United States consul at Brunswick, Germany (1876–88). Subsequently he was United States vice-consul-general at Teheran, Persia. He organized the American Missionary Hospital during the cholera epidemic there in 1892, and established and edited the only strictly diplomatic and consular journal ever attempted in the United States.

FOXE, *fŏks*, John: martyrologist: 1517–87; b. Boston, Lincolnshire, England; of respectable parents. In 1533, he entered as a student at Brasenose College, Oxford; 1538 he took his bachelor's, 1543 his master's degree, and was elected a fellow of Magdalen College. He early showed inclination for Latin poetry, and wrote several plays in that language upon scriptural subjects. Of these the only one that remains, entitled *De Christo Triumphante*, was printed at London 1551, and at Basel 1556, 8vo, and in 1672. The religious movements of the times led him to study the great controversy between Popery and Protestantism, and becoming a convert to the principles of the Reformation, he was, 1545, July 22, expelled from his college for heresy. His father being dead, and his mother married again, his stepfather refused him any further aid, and he was reduced to great distress. For a short time he was employed as tutor to the children of Sir Thomas Lucy

of Charlecote, Warwickshire, and afterward was engaged by the Duchess of Richmond as tutor to the children of her brother, the Earl of Surrey, then a state prisoner in the Tower. In this capacity he remained during the whole reign of Edward VI., but was never, notwithstanding Anthony Wood's assertion to the contrary, restored to his fellowship at Magdalen. 1550, June 23, he was ordained deacon by Ridley, Bp. of London, and preached the doctrines of the Reformation at Reigate. During the reign of Mary, he retired to the continent. On the accession of Queen Elizabeth, he returned to England, 1559, Oct.; and 1563, May, he was induced into the canonry and prebend of Shipton, in the cathedral of Salisbury. He had also the living of Cripplegate, which he soon resigned, and for a year he held a stall at Durham. In 1575, when some Dutch Anabaptists were condemned to the flames in London, Foxe interceded for them with Queen Elizabeth and other persons in authority, but without effect. He wrote numerous controversial and other works, but the one that has immortalized his name is his *History of the Acts and Monuments of the Church*, popularly known as *Foxe's Book of Martyrs*, the first part of which was published at Strasburg 1554. The first English edition appeared in 1563, one vol. folio. Sanctioned by the bishops, it was ordered, by a canon of the Anglican Convocation, to be placed in the hall of every episcopal palace in England, and has gone through innumerable editions. It is not a very critical work, and Rom. Catholics deny its trustworthiness. Foxe died in his 70th year, and was buried in the chancel of St. Giles's, Cripplegate, London.

FOXGLOVE, n. *fŏks'glŭv* [AS. *foxesclife* foxglove; said also to be a corruption of *folksglove*, fairies' glove—this is not probable, seeing how common the anc. practice was of naming plants and flowers after animals]: a well-known poisonous and medicinal plant with flowers resembling fingers of a glove, of a purple or white color; the *Dĭgĭtālis purpŭrĕă*, ord. *Scrophŭlārĭācĕæ*, is a most important medicinal plant. See DIGITALIS.

FOX-HUNTING: a sport, which from its exciting nature, as well as from the qualities of courage and cool calculation requisite in those who thoroughly follow and appreciate it, has long been termed the king of British national sports. In the northern United States it is scarcely known after the English fashion: in some southern states, less thickly settled, it is a favorite sport; though the *Gray fox* (*Vulpes Virginianus*) there pursued does not afford a chase either so long or so severe as the common fox in England gives.

In Great Britain, there are more than 100 hunting establishments, of which far the greater proportion belong to the counties s. of the Tweed. Fox-hunting establishments —in most instances supported by subscription, though sometimes owned by private gentlemen of wealth—are organized and maintained at a very considerable annual cost, the price of a single pack of foxhounds sometimes amount-

ing to several thousand guineas. Every establishment is under the direct superintendence and control of one experienced gentleman, the *master*, and under him again rank the huntsman, whippers-in, earth-stopper, kennel-servants, etc. A 'pack' is composed of from 20 to 60 couples of hounds, the number depending upon the frequency of hunting-days: thus, some packs hunt six days, some five days, others four, and many only two days a week; 30 couples of hounds are a good average; these are carefully reared, fed, and otherwise attended to. The master himself has the general superintendence of the servants, hounds, and horses; and in the hunting-field is general director of the proceedings. Next to him come the huntsman and one, or two 'whippers-in' ('whips'). The huntsman, practically the most important personage in the field, requires to see that his hounds are properly managed and fed in their kennels; duly led to the place of meeting on hunting days; and, what is of more consequence still, that they receive fair-play in the field, and find and hunt their foxes in true style.

A considerable range of country is necessary for the full enjoyment of fox-hunting, the best being diversified by pasturage and plantation. Being a nocturnal feeder, the fox quits his burrow or 'earth'—usually in a gorse brake, or a plantation or covert of underwood—during the night, and returns to it in the morning, and this fact is taken advantage of by those who hunt him for sport. The day and place of 'the meet' is duly advertised and on the night before the hunt, the coverts to be 'drawn' next day are visited either by a duly appointed *earth-stopper* or by the gamekeeper, who, knowing that the foxes are away from home, proceeds spade in hand, from one hole to another, filling them up with earth and brushwood as he goes. Thus, the fox, returning at dawn to his 'earth,' finds ingress denied, and so betakes himself to some neighboring thicket, or to some unenclosed cover of gorse, rushes, etc., where he makes a temporary lair or 'kennel.' When a covert is reached, the huntsman, by a wave of his hand, or a few familiar words, such as 'Eu in! eu in there! good dogs!' 'throws in' his hounds, following immediately after with the first 'whip'. The mounted gentlemen usually remain outside, and take their directions as to stance, etc., from the master, who from this time forward does his best to control and direct their movements. In fact, the master may be said to have the control of the 'field'—that is, the riders—and the huntsman that of the hounds and hunt. The second whip being posted at the covert side, near where it is expected a fox may burst through or 'break,' one or two of the more eager riders are sometimes permitted to jump their horses into the covert, if it be large, to assist in the finding of the fox. Those who remain outside then prepare themselves for their work, and eagerly listen for the first token of the presence of reynard; this is betrayed by a slight but anxious whimper or whine from the 'challenging' hound—that is, the hound (usually an old and experienced one) that

first perceives or 'hits' the scent of a fox—and is soon followed by others, who instantly rush to his side. If the covert be very thick, a fox may leave his kennel unperceived; and when he does so, he usually runs through or round the covert for a considerable distance before quitting it for the open fields. He may also 'run his foil,' by doubling back and forward on the same path or track, and thus possibly baffle the hounds, even when they 'own his scent.' In large coverts, too, a fox frequently 'hangs;' that is, he remains in it for a long time before going away. The person who first sees the fox 'break cover,' or, in other words 'views him away,' should always allow him a certain 'law' before giving the 'view halloo;' as a fox will frequently turn or 'head back' into covert if he hears any unusual noise at the instant of his quitting it. When, however, the person or persons watching see that the fox is really off, notice is instantly given to those within the thicket, and those without, by the cry of 'Hou—y! hou—y! Tallyho! *Gone away*! GONE A-WAY!!' upon which the huntsman blows his horn to collect his hounds; the whipper-in drives out lagging members of the pack, either with his whip or by some cry; the master restrains the more impatient of the riders till the hunstman and hounds have 'settled to' their fox; and then he and the entire field join in the chase, and the exciting part of the day's proceedings has commenced—the fox has 'broke cover,' the hounds have been 'laid on,' and the field has entered on its impetuous 'first burst.' And now begins the grand excitement of the day; the fox being fresh, races away at tremendous speed, followed by perhaps more than 20 couples of hounds at full cry. If the day be propitious (a 'southerly wind and cloudy sky' having long retained favor), the scent of the retreating fox lies well, especially at first, when it is called 'burning' or 'breast high,' and is for many minutes 'owned' by at least all the leading hounds in the pack, though, perhaps, the object of pursuit itself is far ahead, and out of sight; and away streams the hunt over hedges, ditches, and gates, across rivers, railways, arable land, and grass pastures, perhaps for several miles before a single *check* occurs.

When the fox is killed, either in 'the open' or elsewhere, the rider who is first in at 'the death'—usually the huntsman—springs off his horse, with a 'Whoo! whoop!' lashes the hounds off, and cuts off the head, feet (*pads*), and tail (the *brush*).

Much useful and entertaining information on fox-hunting is given in Blaine's *Encyclopædia of Rural Sports* (London, Longmans); *British Rural Sports*, by Stonehenge; Beckford's *Thoughts on Hunting; Reminiscences of a Huntsman; Nimrod; The Field* newspaper; the American *Sportsman's Library*; etc.

FOX INDIANS. See SACS AND FOXES.

FOX ISLANDS. See ALEUTIAN ISLANDS.

FOX RIVER, or PISHTAKA: river of Wis., an affluent of the Illinois which is itself a tributary of the Mississippi.

It is 200 m. long, and is valuable chiefly for its water-power.

FOX RIVER, or NEENAH: river of Wisconsin, abt. 200 m. long, emptying into Green Bay in Lake Michigan. It is divided into two sections by Lake Winnebago, the upper section connected by a canal with the Wisconsin, which is a navigable affluent of the Mississippi, and the channel of the river below Lake Winnebago has been cleared to admit steamboats from Lake Michigan and Green Bay. A grant of land was made by Congress to assist the work.

FOX SHARK, or THRESHER (*Alopias* or *Alopecias*): genus of sharks, containing only one known species (*A. vulpes*), inhabitant of the Mediterranean and of the Atlantic. The snout is short and conical; the spout-holes are very small; the mouth is not so large as that of the white shark, nor the teeth so formidable; but the fox shark is extremely bold and voracious, readily attacking grampuses or dolphins much larger than itself. Its most remarkable peculiarity is the great elongation of the upper lobe of the tail-fin, which is nearly equal in length to the whole body, and into which the vertebral column extends. Of this it makes use as a weapon, striking with great force. It is said to be not uncommon for a whole herd of dolphins to take flight at the first splash of the tail of a fox shark. From the use which it makes of its tail, it has acquired the name of Thresher. It attains a length, tail included, of 13 ft. The body is spindle-shaped.

FOXTAIL GRASS (*Alopecurus*): a genus of grasses embracing several species. Distinguished by a spiked panicle compressed in cylindrical form like the tail of a fox, from which resemblance it receives its name. The two glumes are nearly equal, compressed, and usually united at the base. They inclose a floret which has a single palea bearing a long awn and surrounding three stamens and the pistil. Foxtail grass is a native of temperate regions. It contains some useful species and several of no value, while some are regarded by the farmer as troublesome weeds. MEADOW FOXTAIL GRASS (*A. pratensis*). A native of Great Britain; cultivated successfully throughout Europe and in this country. In England it is considered one of the best of the meadow and pasture grasses; in the United States it is grown to some extent for hay, and is largely sown in permanent pastures. It requires three or four years to reach its maximum rate of production, but when once established remains long in the soil, attaining its highest perfection on moist, rich land, but fairly productive on all soils which are not either extremely dry or wet. It resembles Timothy (*Phleum pratense*), known in some sections as Herd's Grass, but has a softer head, only one palea, and flowers some weeks earlier. The seed is extremely small and weighs only five pounds per bushel. It is subject to blight and to the ravages of insects. While not among the best grasses for cultivation the Meadow Foxtail has few superiors for pastures,

especially where the soil is moist and fertile. It starts early in the spring, grows quickly and luxuriantly after being eaten off by cattle, and the later growth is more abundant and more nutritious than the earlier product. In connection with other suitable grasses it should be liberally sown whenever pasture lands are laid down.

FOX-TERRIER: a small terrier dog modified from the old-fashioned English white terrier of uncertain origin. It has a dense smooth coat white, with black or black-and-tan markings; and a small black nose; and it generally weighs between 15 and 20 pounds, when in good condition. The fox-terrier has a narrow, tapering face, and small, deep-set eyes, usually gentle, but capable of an expression of keen animation; the jaws are strong and well-shaped; and the V-shaped ears droop forward close to the cheek. The compact little body is set on straight, supple legs, and the tail, usually docked, is carried in a rather jaunty fashion. The dog's appearance is one of alertness; and, though originally bred to run the fox to earth, fox-terriers have, latterly, become popular not only as vermin-destroyers about stables, but as house-dogs,—their cleanly, sprightly, and affectionate ways rendering them extremely amiable and entertaining as companions. One variety, the 'wirehaired,' has a rather long coat, of rather shaggy appearance. In all other points this is like the smooth-coated variety. See Dog.

FOY, n. *foy* [F. *foi*, faith—from L. *fĭdem*]: in *OE.*, faith; allegiance.

FOY, n. *foy* [probably a parallel form with Scot. *ploy*, a harmless frolic, a merry social party—perhaps from F. *foyer*, a fire-grate, a hearth: connected with Play, which see]: in *OE.*, a merry-making, as at a parting, or on entering upon a new situation; a merry entertainment.

FOY, Maximilien Sébastien: 1775, Feb. 3—1825, Nov. 28; b. Ham: French general and orator. In 1791, he was one of the volunteers who hastened to defend the frontiers of their country against foreign invasion, and during the next nine years served with distinction under Dumouriez, Moreau, and Massena. In 1800, he was raised to the rank of adj.gen. in the division of Moncey, in the army of the Rhine, which marched through Switzerland into Italy, where he commanded the vanguard of the army 1801. In 1805, he commanded the artillery of the second division in the Austrian campaign. In 1807, Napoleon sent him to Turkey, at the head of 1200 artillerymen, to assist Sultan Selim against the Russians and British. After the revolution in which Selim was dethroned, Foy, under the direction of the French ambassador, General Sebastiani, defended Constantinople and the Strait of the Dardanelles so effectively, that Duckworth, the British admiral, was forced to retire, with loss. 1808–12, Foy was gen. of division of the army in Portugal; he conducted the retreat of the French army across the Douro, was present at all the battles of the Pyrenees, and at Orthez

1814 was dangerously wounded. In the campaign of 1815, he commanded a division on the field of Waterloo, where he was wounded for the 15th time. In 1819, he was elected deputy by the dept. of Aisne. In the chamber, he was the constant advocate of constitutional liberty, and showed great rhetorical talent and knowledge of political economy. Foy died at Paris. Madame Foy published, 1827, from her husband's papers, *Histoire de la Guerre de la Péninsule.* In the previous year appeared his *Discours,* with a biography.

FOYER, n. *foy′yā,* n. or *fwâ′yā* [F. *foyer,* a fire-grate, a hearth—from L. *fŏcus,* a fireplace]: the green-room; saloon in a theatre, etc., in which the audience may promenade during the intervals of an entertainment.

FOY′ERS: stream rising in the Monadleadh Mountains, in the middle of Inverness-shire, Scotland. It flows 12 m. n. and falls into the e. side of Loch Ness, nearly opposite Mealfourvounie Mountain. It has two celebrated falls within a mile and a half of its mouth, where the stream rushes through a deep, narrow ravine in the hills skirting the e. side of the loch. The upper fall is 30 feet high. The stream then descends 30 feet in a quarter of a mile. The lower fall (specially called *The Fall of Foyers*), 90 ft. high, is one of the finest cascades in Britain.

FOYLE, Lough: *loch foyl:* inlet of the Atlantic, on the north coast of Ireland. The west side alone is navigable. Vessels of 600 tons ascend the w. side of the lough, and its chief tributary the Foyle (which comes 16 m. from the s.), to Londonderry. On the e. shore is a flat strand with a sandy beach.

FOZY, a. *fō′zĭ:* in *Scot.,* spongy; very porous. Foziness, n. *fō′zĭ-nĕs,* sponginess; obtuseness of mind.

FRA BARTOLOME′O. See Baccio della Porta.

FRACAS, n. *fră-kâ′* [F. *fracas,* a crash, destruction—from *fracasser,* to shatter—from It. *fracassare,* to break in pieces: a word imitative of a clatter of falling things]: a noisy quarrel; a brawl; an uproar.

FRACASTORO, *frâ-kâs-to′ro,* Girolamo: 1483–1553; b. Verona; of anc. family: Italian philosopher, famous for the universality of his learning. At the age of 19, he was appointed prof. of logic in the Univ. of Padua. But his vast knowledge embraced the most divergent sciences; and, on account of his eminence in the practice of medicine, he was elected physician of the Council of Trent. His Latin verse has remarkable elegance. A bronze statue was erected in his honor by the citizens of Padua, while his native city commemorated their great compatriot by a marble statue. His writings in prose and verse are numerous. The chief are: *Syphilidis, sive Morbi Gallici* (Verona 1530, 4to; Paris 1531 and 1539, 8vo; London 1720, 4to, and 1746, 8vo; Italian ed. Verona 1739, 4to, by Tiraboschi; Naples 1731, by Pietro Belli); *De Vini Temperatura* (Venice 1534, 4to) *Homocentricorum sive de Stellis, De Causis*

Criticorum Dierum Libellus (Venice 1535, 4to); *De Sympathia et Antipathia Rerum, De Contagionibus et Contagiosis Morbis, et eorum Curatione* (Venice 1546, 4to; Lyon 1550, 54, 8vo). The collective works of Fracastoro appeared for the first time, Venice 1555, 4to.

FRACTED, a. *frăk'tĕd* [L. *fractus*, broken]: in *OE.*, broken; infringed; in *her.*, broken asunder.

FRACTION, n. *frăk'shŭn* [F. *fraction*, a fraction—from L. *fractĭōnĕm*—from *fractus*, broken in pieces]: the act of breaking; a broken part of a whole; a part of a whole or unity; in *arith.*, a part of a unit, as $\frac{1}{2}$, $\frac{1}{4}$, $\frac{3}{4}$. FRAC'TIONAL, a. *-shŭn-ăl*, pertaining to fractions.—SYN. of 'fraction': fragment; fracture; rupture; portion; part; scrap.

FRACTION: in Arithmetic and Algebra: one or more of the equal parts of a unit or whole. It involves two members, a denominator and a numerator, whereof the former shows into how many equal parts the unit is divided and the latter shows how many of them are taken in a given case. Thus $\frac{3}{4}$ denotes that the unit is divided into four equal parts, and that three of them are taken; and more generally a/b denotes that the unit is divided into b equal parts, and that a of them are taken. This definition is incomplete, since it excludes cases where a and b are fractions, as in $\frac{2/3}{4/5}$, or negative numbers, as in $\frac{-2}{3}$. The definition includes terminable decimals, like .75, but excludes interminable decimals, like .151515.... More comprehensively defined, a fraction is an expressed division or a symbolic result of a division which cannot be actually effected. Such a definition will not serve the purposes of elementary teaching. In elementary instruction, the metrical idea of a fraction is almost indispensable. The advanced mathematician prefers to ignore all idea of measurement and to offer an *ordinal* definition, according to which fractions, as well as integers, are looked upon as assemblages which follow one another in a definite and known order, so that we can always tell of any two numbers, which precedes and which follows the other. If a and b are integers, and a precedes b in the natural scale, we indicate this by the symbols $a < b$. Two numbers a/b and c/d occur in the same relative order as the products ad and bc. If $ad < bc$, then $a/b < c/d$, and a/b precedes c/d. Thus $\frac{3}{5}$ precedes $\frac{5}{7}$, because $3 \times 7 < 5 \times 5$. Again, $\frac{0}{1} < \frac{3}{5}$, since $0 \times 5 < 1 \times 3$, and $\frac{3}{5} < \frac{1}{1}$, since $3 \times 1 < 5 \times 1$; hence $\frac{3}{5}$ lies between 0 and 1. For a full exposition of this view, see H. B. Fine, *College Algebra*.

A fraction is called *proper* when the numerator is less than the denominator, and *improper* when the numerator is greater than the denominator. The rules of operation of fractions are the same in algebra as in arithmetic. To add two or more fractions together, we must bring them to a common denominator, and add the numerators for a new numerator, and take the common denominator for the new denominator. Thus, if a/b, c/d are two frac-

tions, then $\frac{a}{b}+\frac{d}{c}=\frac{ad}{bd}+\frac{bc}{bd}=\frac{ad+bc}{bd}$. It is usually best to find the lowest common denominator. Thus in adding $\frac{3}{4}$ and $\frac{1}{6}$, the product of the given denominators, 24, may be taken as the common denominator, but it is simpler to take 12, the *lcast* common multiple of 4 and 6. Then $\frac{3}{4}+\frac{1}{6}=\frac{9}{12}+\frac{2}{12}=\frac{11}{12}$. To subtract two fractions, bring them to a common denominator and subtract the numerator of the subtrahend from the numerator of the minuend for the new numerator. Thus $\frac{a}{b}-\frac{c}{d}=\frac{ad-bc}{bd}$. To multiply two fractions together, the rule is, to multiply the numerators together for a new numerator, and the denominators together for the new denominator. Thus $\frac{a}{b}\times\frac{c}{d}=\frac{ac}{bd}$. The reasons for all these rules are obvious. The rule of division is to invert the divisor, and proceed as in multiplication. This follows from the consideration, that to *divide* is the inverse of to multiply, and that to divide by a/b must be the same thing as to multiply by b/a.

FRACTIONS, CONTINUED, in Algebra: the name given to expressions of the form $a+\cfrac{b}{c+\cfrac{d}{e+\ldots}}$ If the numerators are all unity, as in $a+\cfrac{1}{c+\cfrac{1}{d+\ldots}}$, the continued fraction is called *simple*. To reduce A/B to a continued fraction, divide A by B. Then $A/B=a+\frac{a^1}{B}$. Similarly, $\frac{B}{a^1}=b+\frac{b^1}{a^1}$, $\frac{a_1}{b_1}=c+\frac{c_1}{b_1}$, and $\ldots\frac{k_i}{l_i}=m+\frac{m_1}{l_1}$, etc. Then

$$A/B=a+\cfrac{1}{b+\cfrac{1}{c+\ldots\cfrac{1}{m+\cfrac{1}{n+\ldots}}}}$$

If, in this continued fraction, we consider the parts (1) a, (2) $a+\frac{1}{b}$ or $\frac{ab+1}{b}$, (3) $a+\cfrac{1}{b+\cfrac{1}{c}}$ or $\frac{(ab+1)c+a}{bc+1}$, etc., we obtain a series of fractions *converging* to the value of A/B. These converging fractions are always approximating to the value of A/B, and are alternately greater and less than it. Throughout the series the 1st, 3d, 5th, 7th, etc., are each below the true value, while the 2d, 4th, etc., are above it; or *vice versa*, according as the original fraction is improper or proper. It can be shown that the successive converging fractions approach nearer and nearer to the true value of the continued fraction.

An irrational number, say $\sqrt{3}$, can be converted into a simple continued fraction as follows: The greatest integer less than $\sqrt{3}$ is 1, and $\sqrt{3}=1+(\sqrt{3}-1)=1+\frac{2}{\sqrt{3}+1}=1\times\frac{1}{\frac{1}{2}(\sqrt{3}+1)}$, $\frac{\sqrt{3}+1}{2}=1+\frac{\sqrt{3}-1}{2}=1+\frac{1}{\sqrt{3}+1}$, $\sqrt{3}+1=2+(\sqrt{3}-1)=2+\frac{1}{\frac{1}{2}(\sqrt{3}+1)}$, $\frac{\sqrt{3}+1}{2}=1+\frac{1}{\sqrt{3}+1}$, etc. Hence,

$$\sqrt{3}=1+\cfrac{1}{1+\cfrac{1}{2+\cfrac{1}{1+\cfrac{1}{2+\cfrac{1}{1+\ldots}}}}}$$

This is an example of a nonterminating continued fraction, which is *recurring*. It may be more compactly written $\frac{1}{1}+\frac{1}{1}+\frac{1}{2}+\frac{1}{1}+\frac{1}{2}+\ldots$ Here the first convergent is 1, the second $\frac{1}{1}+\frac{1}{1}=2$, the third is $\frac{1}{1}+\frac{1}{1}+\frac{1}{2}=\frac{5}{3}$, etc. Finding other convergents in a similar manner, we have the following approximations to the value of $\sqrt{3}$: $1, 2, \frac{5}{3}, \frac{7}{4}, \frac{19}{11}, \frac{26}{15}, \frac{71}{41}, \ldots$

Any of these fractions, say $\frac{71}{41}$, is a closer approximation to $\sqrt{3}$ than any other simple fraction whose denominator does not exceed that of the fraction under consideration, i.e., 41. It is found that $\frac{71}{41}$ expresses $\sqrt{3}$ with an error less than $\frac{1}{41^2}$. The differences between the approximate values and the true value grow less as we proceed, for the reason that the denominators of the convergents continually increase. Continued fractions have been used in the solution of indeterminate equations and by Lagrange also in the solution of determinate numerical equations of one unknown quantity. Perhaps the most important use is to find a fraction, whose denominator does not exceed a given integer, which shall most closely approximate to a given number rational or irrational.

FRACTIONS, VANISHING: algebraical fractions in which the substitution of some particular value for the unknown quantity will make both the numerator and the denominator of the fraction vanish. Thus the fraction $\frac{x^2-a^2}{x-a}$ assumes the form $\frac{0}{0}$ when $x=a$. The ascertainment of the value of such a fraction for the particular value of the unknown quantity which gives it the form $\frac{0}{0}$ requires the application of the theory of limits and may be effected by a general method furnished by the differential calculus. But frequently the value may be determined by simpler means, as the form $\frac{0}{0}$ arises from the existence of a factor common to both numerator and denominator, which becomes zero for particular values of x. If we put $x=a+z$ in the above fraction, it becomes $\frac{(a+z)^2-a^2}{(a+z)-o}=\frac{2az+z^2}{z}$. If z is not allowed to become zero, then we can divide both terms of the fraction by z and obtain $2a+z$. If z is made to decrease toward zero as a limit, (without being permitted to reach its limit), then the limit of $2a+z$ and of the fraction itself is readily seen to be $2a$. Hence $2a$ is taken as the value of the vanishing fraction, when $x=a$. Similarly, the value of $\frac{x^3-1}{x-1}$ is 3 for $x=1$. The symbol $\frac{0}{0}$ cannot be assigned any determinate value, unless its origin is known; that is, unless the functions constituting the numerator and the denominator of the fraction giving rise to it are

known, so that their vanishing for a particular value of the variable can be examined from the standpoint of limits. See LIMITS, THEORY OF; NOTHING; INFINITY.

FRACTIOUS, a. *frăk'shŭs* [formed from prov. Eng. *fratch*, to squabble, to quarrel: partly imitative]: apt to break out into a passion; peevish; apt to exhibit ill-humor; quarrelsome. FRAC'TIOUSLY, ad. *-lĭ*. FRAC'TIOUSNESS, n.—SYN. of 'fractious': peevish; irritable; snappish; cross; waspish; pettish.

FRACTURE, n. *frăk'tūr* [F. *fracture*—from L. *fractūră*—from L. *fractus*, broken in pieces]: a break; a broken bone: V. to break; to crack. FRAC'TURING, imp. FRAC'TURED, pp. *-tūrd:* ADJ. broken; cracked. SIMPLE FRACTURE, the breaking of a bone without the injury of the skin or adjacent soft parts. COMPOUND FRACTURE, a broken bone with a wound through the skin and muscles, and exposure of bone. COMMINUTED FRACTURE, a bone broken into several small fragments: see FRACTURES (below).

FRACTURES: a fracture is a break, in other words, a solution in the continuity of a bone. As a rule it is produced by violence, in which case it is called 'traumatic.' In rare events it is caused by disease. Then it is termed 'spontaneous,' a pathological fragility of the bones, due to tumors like some forms of cancer, or to inflammatory processes, or to constitutional diseases, like scurvy or syphilis, being responsible.

Traumatic fractures may be *simple* (Fig. 1) or *compound.* In a simple fracture the bone is broken either at one or at more points, no communication with the atmosphere existing. Therefore they are also called 'subcutaneous.' In a compound fracture the bone may also be broken at one or more points, while there is communication with the atmosphere, which by opening an avenue of infection gives this type its severe character. Regarding the degree of separation in the continuity of the bone, distinction must be made between *complete* (Fig. 2) and *incomplete* fractures, in the complete variety the whole bone being separated, while in the incomplete type the outer side (cortical substance) only yields and tears, while the inner stratum is only bent. This condition, also called 'infraction,' is best compared to the bending and partial splintering of a green stick, wherefore it is commonly called 'green stick fracture.' It is mostly found in children. The direction of a fracture line may be transverse, oblique, longitudinal and spiral. In most broken bones more or less displacement of the bone-ends takes place. In order to be able to reduce the displaced fragments it is necessary to recognize the direction in which the displacement occurred. It may be *lateral,* that is at a right angle to the long axis of the bone, or *axial,* that is at an acute angle, or *longitudinal,* that is parallel to the long axis, or *peripheral,* that is, when the broken fragment is turned around the long axis of the bone (torsion). The proper recognition of the spiral kind of displacement marks the most impor-

FRACTURES.

1. Fracture of Skull, Showing Moderate Displacement.
2. Fracture of the Femur (Spiral-shaped).
3. Upward Displacement (Silver Fork Deformity) in Fracture of Lower End of Radius.
4. Irreducible Fragments in Fracture of Lower End of Radius Exposed by the Scalpel and Wired.

tant point in the treatment of fractures, as the success of treatment hinges mainly on it. In complete fractures small fragments are sometimes severed from the bone, in which case a 'comminuted' fracture is spoken of. Most fractures occur on the extremities. They represent three-fourths of all fractures, while those of the bones of the trunk comprise one-sixth and those of the skull one-twenty-fifth.

The fractures of the forearm show 18 per cent., those of the leg as well as of the ribs and of the collar-bone 15 per cent., the hand 11 per cent., the arm 7 per cent., the thigh 6 per cent., the foot 2.6 per cent., the face 2.4 per cent., the skull 1.4 per cent., the knee-cap 1.3 per cent., the shoulder-blade, the spinal column and the pelvis less than 1 per cent. Most fractures occur between the thirtieth and fortieth year and are four and a half times more frequent in men than in women.

The most important *signs* of a fracture are: Abnormal mobility, crepitation, functional disability, deformity, ecchymosis, and pain, abnormal mobility being the most characteristic of all. It may be absent when the broken ends are indentated (teethed) and driven into each other (impaction). Crepitation (syn. *crepitus*) is the peculiar sensation felt when friction is produced between the two separated bone fragments. Functional disability is nearly always present, in case of fracture of the wrist, the hand not being able to grasp things, or in case of fracture of the leg, the patient being unable to walk. The degree of deformity is in proportion to that of the displacement. Where little displacement is present little or no deformity is observed. Ecchymosis is produced by the tearing of small blood vessels in and underneath the skin as well as in the medulla of the bone. It is more marked on the skin a few days after the injury, when it gradually assumes the rainbow colors. Local pain is a constant sign and is increased by digital pressure and by every effort that displaces the fragments. If all the signs mentioned are present, the recognition of a fracture does not present any difficulties. But if there be an infraction or fissure, or if the fracture be impacted, or if the break occurred near a joint, or if there be extensive inflammation, the injury may be mistaken for a contusion or distortion or even for a dislocation (luxation). It should also be considered that the simple recognition of the fact that a fracture has taken place, does not give sufficient information as to the indications for treatment. Modern surgery demands that the direction of the displacement, if there be any, be determined, furthermore that the details of the situation, the shape and number of the fragments besides their correlation be elicited. In former years, that is before the discovery of the miraculous Roentgen rays (q.v.) this was impossible. An enormous number of bone injuries formerly could not be recognized in their true character on account of the swelling of the area involved, or on account of the obscurity of the signs. To-day a simple glance with the Roentgen

screen (fluoroscope) decides the question, whether there be comminution, impaction, or intervention of tissue between the bone-fragments just as clearly as the question whether the fracture line is running into a joint (intra-articular) or is associated with dislocation or other complications. In a number of nondisplaced fractures considerable effusion of blood takes place, especially if they are of the intra-articular type. The main sign of this type of fracture is a swelling of the area involved. This produces a deformity which in most cases gives the erroneous impression that displacement was present. Naturally the surgeon would then be tempted to make reducing manipulations which are most harmful to the patient, because they cause the very thing which the surgeon likes to avoid, viz., displacement. Now the Roentgen rays (X-rays) penetrate any amount of effusion and tell us precisely, therefore, whether there is displacement, in other words, whether manipulations are necessary or not. Practically, therefore, they direct us to avoid any manipulations, if there be no displacement. All we should then do is protect the injured limb, either by a wooden or iron splint, or preferably by a plaster-of-Paris dressing, which adapts itself to any shape of the body and permits of continuous control of the condition of the bone-fragments by the Roentgen method since this admirable material offers no obstacle to the rays. But if there be more or less displacement, the fragments must be brought back to where they had been before, that is, to their normal position. After exact reposition has been attained, proper fixation (immobilization) in the normal position is in order. For the purpose of immobilization plaster-of-Paris is also the ideal material. If reduction is perfect, the fragments will unite except in rare cases of disease of the bone. It is not the surgeon who unites, but the formation of a bone-tissue, called 'callus' which originates between the broken ends and gradually fills up the separation line, thus restoring the continuity of the broken bone. Most of this substance is formed from the periosteum (skin of the bone), the deposition of calcareous matter giving the glue-like mass sufficient firmness. The surgeon must be careful to maintain exact coaptation of the fragments so that the process of callus-formation is not disturbed. The length of time necessary for perfect consolidation varies between two and twelve weeks according to the size of the bones.

If proper reposition were not accomplished, nature in its admirable tendency to overbridge errors, surrounds the separated fragments by excessive callus masses, so that they are baked together, so to speak, in a large mass of callus forming around the periphery of the bone ends. If this take place in the middle of a long bone, there may be but little disturbance of function, but if situated near a joint, the limb may become stiff or the pressure of the viciously united fragments upon the soft tissues may produce inflammation or atrophy of important structures, especially of the nerves. If the false position be recognized at an

early date, say two weeks after the fracture was sustained, correction under ether-anesthesia may be possible by simple forcible bending (bloodless separation). But if more time has elapsed, restoration is to be accomplished by incising the fragments, severing them by the aid of a chisel and bringing the bone-ends into coaptation. As a rule the position is secured by boring a hole into each end of the fragments and keeping them together by a strong bronze wire suture.

A résumé of these points shows, that fractures vary considerably as far as their significance and the treatment are concerned. This fact, which is by no means appreciated by the public at large, accounts for the different results, for which the surgeon is always, and often unjustifiably, held responsible. A fracture not associated with any displacement and consequently not having produced any injury to the soft tissues around often heals not only under any kind, but sometimes in spite of any kind, of treatment. This is well proven by the fact that such fractures take a most favorable course even if treated by most ignorant quacks. On the other hand, a comminuted fracture may show an unsatisfactory result in the hands of the most excellent surgeon. No one would expect a thorough restoration to integrity in the case of a fracture of the elbow when the lower end of the armbone was completely shattered. It would be impossible then to unite a dozen of its splinters in such a manner that a regular joint surface could be obtained again. The surgeon will therefore always act wisely by insisting upon an X-ray exposure in all cases of suspected fracture, not only for the sake of his patient but also for his own protection because a Roentgen picture will furnish him with a document, which will always prove the severity of the condition. Sometimes the fragments are so entangled that they cannot be reduced at all so that a chisel operation followed by wiring is indicated from the beginning. See Figs. 3 and 4.

As to further details on the advantages of the Roentgen method see ROENTGEN RAYS.

FRA DIAVOLO, *frâ dē-â'vo-lo*, properly MICHELE PEZZA: 1760–1806, Nov.; b. Calabria: brigand and renegade monk. Of plebeian origin, he was first a stocking-weaver, then entered the Neapolitan army, and subsequently the service of the pope; finally, he abandoned military life, and became a monk, but being expelled for misconduct, he withdrew to the mountains of Calabria, where he headed a band of desperadoes, whose strongholds lay chiefly in the district between Itri and Terra di Lavoro. Pillage, bloodshed, and atrocious cruelties, signalized his career. For years he evaded the pursuit of justice by retiring to his haunts amid mountains and forests, and skilfully defeating, with much inferior numbers, all the armed forces dispatched against him. He became at length known among the peasantry of the neighborhood as Fra Diavolo. On the advance of the French into the Neapolitan states, Fra Diavolo and his band espoused warmly the royal interests,

and in return were not only pardoned and reinstated in civil rights, but promoted to the grade of officers in the royal army, Fra Diavolo himself becoming colonel. In 1806 he attempted to excite Calabria against the French, but was taken prisoner at San Severine, and was put to death at Naples. The opera of Auber has nothing in common with Fra Diavolo but the name. He died uttering imprecations on the queen of Naples and the British admiral, Sidney Smith, whose influence had not sufficed to rescue him from death, though on his capture he produced papers bearing the royal seal, which vouched for his right to the rank of colonel in the royal forces.

FRÆNUM, n. *frē′nŭm* [L. a bridle]: in *anat.*, name given to several membranous folds which bridle and retain certain organs, as *frænum linguæ*, a fold of the mucous membrane, binding down the tongue. The *Synovial fræna* are folds or duplications of the synovial membrane passing from one portion of it to another.

FRAGA′RIA. See STRAWBERRY.

FRAGILE, a. *frăj′ĭl* [F. *fragile*—from L. *fragĭlĭs*, brittle—from *frango*, I break: It. *fragile*]: easily broken; brittle; weak; frail. FRAG′ILELY, ad. *-lĭ*. FRAGILITY, n. *fră-jĭl′-ĭ-tĭ*, brittleness; weakness; frailty.—SYN. of 'fragile': brittle; frail; frangible; feeble; weak; infirm.

FRAGMENT, n. *frăg′mĕnt* [F *fragment*—from L. *fragmen′tum*, a piece broken off: It *frammento*]: a part broken off; a small detached portion; an imperfect part. FRAGMENTAL, a. *frăg-mĕn′tăl*, consisting of fragments. FRAG′MENTED, a. broken into fragments. FRAGMENTARY, a. *frăg′mĕn-tėr-ĭ*, composed of fragments.

FRAGRANT, a. *frā′grănt* [L. *frāgran′tĭă*, scent, odor—from *fragrans*, smelling sweetly: F. *fragrant;* It. *fragrante*, fragrant]: that smells agreeably; sweet-scented; odorous. FRA′GRANTLY, ad. *-lĭ*. FRA′GRANCE, n. *-grăns*, or FRA′GRANCY, n. *-grăn-sĭ*, sweetness of smell; odor.—SYN. of 'fragrant': odoriferous; aromatic; balmy; spicy; ambrosial; redolent;—of 'fragrance': scent; perfume; smell.

FRAIL, a. *frāl* [F. *frèle;* OF. *fraile*, frail—from L. *frăgĭlĭs*, easily broken]: weak: infirm: easily injured or destroyed; liable to err. FRAIL′LY, ad. *-lĭ*. FRAILTY, n. *frāl′tĭ*, a particular fault or sin; a foible; an error; weakness of resolution or will; instability. FRAIL′TIES, n. plu. *-tĭz*, faults or sins of weakness; errors; foibles.—SYN. of 'frailty': failing; frailness; infirmity; imperfection; weakness.

FRAIL, n. *frāl* [OF. *frayel*, a mat basket (see FRAIL 1)]: a kind of rush; a mat or rush basket in which raisins and figs are imported, the varying weight of such a package not exceeding 70 lbs.

FRAISE, n. *frāz* [F. *fraise*, a pointed stick]: in *mil.*, a defense consisting of pointed iron or wooden spikes in a horizontal or inclined position; a *chevaux-de-frise:* see CHEVAL-DE-FRISE.

FRAISED, a. *frāzd* [F. *fraise*, a ruff]: another spelling of FRAYED.

FRAMBOYS, or FRAMBOISE, n. *frăm'boyz* [F. *framboise*, a raspberry (the fruit); *framboiser* (the bush)]: the raspberry, *Rubus idæus*.

FRAME, n. *frām* [Bret. *framm*, a framework; *framma*, to join, to unite: Ger. *rahmen;* Dut. *raem*, a frame: comp. Gael. *freumh*, a root, an origin]: a structure or design afterward to be filled up and completed; a structure formed of united parts; anything made to inclose or surround something else; that on which anything is held or stretched; order; particular state, as of the mind; in *gardening*, the covering of any kind of hotbed, flued pit, or cold pit, used for the cultivation of plants not sufficiently hardy for the open air. Frames are of various materials, but usually of glass set in wood or iron, and are made in one piece or in sashes according to the size of the hotbed or pit. FRAME, v. to form or shape; to fit one thing to another; to compose; to draw up; to scheme out. FRA'MING, imp. jointing, putting together, or building up of any kind of artificers' work: for framing of timber generally, see CARPENTRY: for special kinds of framing, see CENTERING: DOOR: FLOORS: PARTITIONS: ROOFS. In such trades as mathematical, optical, philosophical, and other complex instrument making, the workman who does flat-filed work, and fits all the parts, and puts the whole instrument together, is called the *framer*, and his work *framing*. In the watch-trade, the man who frames all the parts together and builds up the watch, is called a finisher, and his work is called finishing, though it corresponds with what is called framing in other trades. FRAMING, n. the skeleton; the rough timber-work of a house. FRAMED, pp. *frāmd*, fitted and united in proper form; composed. FRA'MER, n. one who. FRA'MABLE, a. *-mă-bl*, that may be framed. FRAMEWORK, n. that which supports or incloses something else.

FRAMINGHAM, *frām'ĭng-ham:* town in Middlesex co., Mass.; on the Boston and Albany railroad and Sudbury river; 22 m. w. of Boston, and also reached by the New York New Haven and Hartford R. R. It contains the villages of Centre and South F., Saxonville and Nobscot, state normal school (oldest in the U. S.), public library; large woolen mills (Saxonville), boot and shoe, carriage, straw goods, chairs, and rubber factories (South F.), and is a growing industrial centre. Pop. (1890) 9,239; (1900) 11,302.

FRAMPOLD, a. *frăm'pōld* [OE. *frump*, a cross old woman: W. *ffromfol*, passionate—from *ffromi*, to fret]: in *OE.*, ill-natured; cross; peevish.

FRANC, n. *frăngk:* a French silver coin and money of account, which (since 1795, when it supplanted the livre Tournois) forms the unit of the French monetary system, and has been adopted as such also by Belgium, Italy, Switzerland, Greece, Roumania, Servia, and Spain. In Belgium and Switzerland it is known as the franc; in Italy, *lira;* in Greece, *drachma;* in Roumania, *lei;* in

Servia, *dinar;* and in Spain, *peseta.* It was named from the old device on it, *Francorum Rex,* the king of the Franks or Freemen. The franc is coined of silver, nine-tenths fine, and weighs five grammes, its value being about 9½*d.* sterling, or abt. 19 cents. One pound sterling=25.2 francs. The franc is divided into 100 centimes, but the old division into 20 sous is still in common use. There are in France silver coins of ¼, ½, 1, 2, and 5 francs; and in gold pieces of 5, 10, 20, 50, and 100 francs.

FRANÇAIS, François Louis, *frân-swâ loo-ē frân-sā,* French painter: b. Plombières, department of Vosges 1814, Nov. 17; d. 1897. He was a pupil of Corot and Gigoux at the Beaux Arts, first exhibited at the Salon in 1837, obtained a medal of the first class at the Salon of 1848, and was admitted a member of the Institute in 1890. He became best known as a landscapist, particularly for his views of the Paris environs and glimpses of the Seine. His finest work, *Daphnis and Chloë,* is in the Luxembourg, together with three other canvases, *Evening, Orpheus,* and *The End of Winter.* His style is peculiarly individual in its combination of realism and idealism.

FRANCE, Joseph, French publicist: b. Lorraine 1787; d. 1869. Having entered the French army in 1815, he had become a colonel in 1834, and in 1836–46 was commander of military police in the island of Martinique, West Indies. The publication of his *La vérité et des faits* (1841), a work descriptive of the ill-treatment of negro slaves in the island, caused his removal from his post and trial for sedition.

FRANCE, *frăns,* Lewis Browne, American author: b. Washington, D. C., 1833, Aug. 8; d. Denver, Col., 1907, June 8. He was educated at Georgetown College, and entered the practice of law in Colorado, of whose supreme court reports he edited volumes III.-XI. His publications include: *Rod and Line* (1884); *Mountain Trails and Parks in Colorado* (1886); *Over the Old Trail* (1894); *Pine Valley* (1897).

FRANCE, *frăns,* F. *frŏngs:* most westerly portion of central Europe, from 42° 20′ to 51° 5′ n. lat. and from 8° 15′ e. long. to 4° 54′ w. long. It is bounded n. by the Channel and the Straits of Dover, which separate it from England, by Belgium, the grand duchy of Luxembourg, and the Rhenish provinces of Prussia; and on the e. by the lately annexed German provinces of Alsace and Lorraine, by several of the Swiss cantons, and by Italy; on the s. by the Mediterranean and the dominions of Spain from which it is separated by thè Pyrenees; and on the w. by the Atlantic (the Bay of Biscay). The greatest length of France, from Dunkirk in the n. to the Col de Falguères in the s. is about 580 m.; greatest breadth from e. to w., from the new boundary line in the Vosges to Cape St. Matthieu in Finisterre, is about 570 m. Its circumference, inclusive of sinuosities, is estimated at nearly 3,100 m. or 5,000 kilomètres, of which nearly half is composed of maritime coast-

FRANCE,
BELGIUM AND
SWITZERLAND.
SCALE OF STATUTE MILES.
0 50 100 150 200 250
Copyright, 1899, by Rand, McNally & Co.
R., MC N. & CO., ENGR'S, CHI.
Longitude from Greenwich.
FRANCE
BELGIUM
SWITZERLAND
ENGLAND
PARIS
BRUSSELS
BERN
CORSICA
(TO FRANCE)
ENGLISH CHANNEL
BISCAY
OF
MEDITERRANEAN
SEA
PYRENEES MOUNTAINS
ALPS
GULF OF LYONS
GULF OF GENOA
Andorra
Cherbourg
Le Havre
Brest
Nantes
Bordeaux
Marseilles
Toulon
Nice
Monaco
Genoa
Milan
Turin
Lyons
Strasburg
Metz
Nancy
Rheims
Orleans
Tours
Limoges
Toulouse
Montpellier
Nimes
Avignon
Dijon
Geneva
Zurich
Basel
Lucerne
Mt. Blanc
Mt. Cenis
Mt. Cinto
Mt. Rotondo
Ajaccio
Bastia
Corte
Porto Vecchio
Sartene
Cape Corso
Calvi
I. Giglio
I. Capraja
Elba
Pisa
Leghorn
Spezia
Rapallo
Savona
Oneglia
Ventimiglia
Cannes
Aix
Draguignan
Arles
Tarascon
Cette
Perpignan
Rosas
Cape Creux
Gerona
Barcelona
Bilbao
Santander
St. Sebastian
Bayonne
Biarritz
Pau
Auch
Agen
Bergerac
Perigueux
Limoges
Poitiers
Niort
La Rochelle
Rochefort
Saintes
Angoulême
Cognac
Blaye
Libourne
Arcachon
Mimizan
Dax
Mont de Marsan
Roquefort
Orthez
Tarbes
Lourdes
Foix
Carcassonne
Narbonne
Beziers
Montauban
Cahors
Villeneuve
Rodez
Mende
Privas
Valence
Grenoble
Chambery
Annecy
Aix la Chapelle
Cologne
Bonn
Coblenz
Wiesbaden
Frankfort
Mannheim
Heidelberg
Worms
Mentz
Treves
Luxemburg
Metz
Nancy
Strasburg
Carlsruhe
Baden
Stuttgart
Wurtemburg
Nuremburg
Augsburg
Munich
Innsbruck
Constance
Schaffhausen
Lucerne
Interlaken
Lausanne
Geneva
Chamouni
Mt. Blanc
Turin
Milan
Verona
Mantua
Modena
Parma
Brescia
Bergamo
Como
Maggiore
Lugano
Trent
Meran
Botzen
Innsbruck
Kempten
Freising
Landshut
Ansbach
Wurzburg
Baireuth
Meiningen
Eisenach
Gotha
Marburg
Giessen
Wetzlar
Offenbach
Hanau
Darmstadt
Mainz
Bingen
Coblenz
Bonn
Cologne
Aix la Chapelle
Liege
Namur
Charleroi
Mons
Valenciennes
Lille
Roubaix
Calais
Dunkirk
Ghent
Bruges
Ostende
Antwerp
Malines
Brussels
Ypres
Courtray
Douay
Arras
Abbeville
Amiens
St. Quentin
Ardennes
Sedan
Rheims
Soissons
Laon
Beauvais
Rouen
Neufchatel
Dieppe
Yvetot
Caen
Cherbourg
Le Havre
Alderney
Guernsey
Jersey
Channel Is. (Br.)
St. Helier
Ouessant I.
Morlaix
St. Malo
St. Brieuc
Loudeac
Quimper
Penmarch Pt.
Lorient
Vannes
Redon
Rennes
Mayenne
Laval
Chateaubriant
Le Mans
La Fleche
Chartres
Versailles
Argentan
Avranches
Granville
Coutances
Carentan
Evreux
St. Germain
Meaux
Coulommiers
Epernay
Chalons sur Marne
Vitry
Bar le Duc
Commercy
Toul
Epinal
Remiremont
Luneville
St. Dizier
Nancy
Belle Ile
I. de Noirmoutier
I. d' Yeu
Les Sables d' Olonne
I. de Ré
I. d' Oleron
Le Verdon
Lesparre
Penmarch Pt.
Pontarlier
Besançon
Vesoul
Montbeliard
Belfort
Mulhausen
Colmar
Schaffhausen
Freiburg
Schwarzwald
Hohen Zollern
Danube R.
Rhine R.
Saar R.
Moselle R.
Meuse R.
Aisne R.
Oise R.
Somme R.
Seine R.
Marne R.
Loire R.
Rhone R.
Saone R.
Garonne R.
Dordogne R.
Adour R.
Tarn R.
Lot R.
Aveyron R.
Durance R.
Isere R.
Allier R.
Cher R.
Vienne R.
Indre R.
Maine R.
Sarthe R.
Mayenne R.
Aude R.
Ter R.
Var R.
Po R.
Arno R.
Tiber R.
Main R.
Neckar R.
Danube R.
Inn R.
Isar R.
Lech R.
Mouths of the Rhone
Cape Creux
Mt. Perdu
Majadetta
Pic du Midi
Pic de Nethou
Mt. Maladetta

lines, which are subdivided in the proportion of about 400 m. on the Mediterranean, 585 m. on the Atlantic, and about 570 m. on the n. frontiers. France is divided into 87 departments, named mostly from the rivers or mountains by which they are intersected. The area of France, and Corsica, a dept. of the republic, is reckoned at about 207,000 sq. m. (For the foreign possessions of France, see below.)

Old Provinces.	Departments.	Area in Eng. sq. Miles.	Population in 1901.
1. Ile de France	1. Seine	185	3,669,930
	2. Seine-et-Oise	2,184	707,325
	3. Seine-et-Marne	2,275	358,325
	4. Oise	2,272	407,808
	5. Aisne	1,866	535,583
2. Champagne	6. Ardennes	2,027	315,589
	7. Marne	3,167	432,882
	8. Marne (Haute)	2,420	226,545
	9. Aube	2,326	246,163
3. Lorraine	10. Meuse	2,408	283,480
	11. Meurthe-et-Moselle	2,036	484,722
	12. Vosges	2,303	421,104
4. Flanders	13. Nord	2,228	1,866,994
5. Artois	14. Pas de Calais	2,606	955,391
6. Picardy	15. Somme	2,443	537,848
7. Normandy	16. Seine-Inférieure	2,448	837,824
	17. Eure	2,330	334,781
	18. Calvados	2,197	410,178
	19. Manche	2,475	491,372
	20. Orne	2,371	326,952
8. Brittany	21. Finisterre	2,729	773,014
	22. Morbihan	2,738	563,468
	23. Côtes-du-Nord	2,786	609,349
	24. Ille-et-Vilaine	2,697	613,567
	25. Loire Inférieure	2,693	664,971
9. Pitou	26. Vendée	2,690	441,311
	27. Sèvres (Deux-)	2,337	342,470
	28. Vienne	2,711	336,343
10. Anjou	29. Maine-et-Loire	2,811	514,658
11. Maine	30. Mayenne	1,986	313,103
	31. Sarthe	2,410	422,699
12. Angoumois, Aunis, and Saintonge	32. Charente	2,305	350,305
	33. Charente-Infér'e	2,791	452,149
13. Touraine	34. Indre-et-Loire	2,377	335,541
14. Orléannais	35. Loir-et-Cher	2,478	275,538
	36. Eure-et-Loir	2,291	275,433
	37. Loiret	2,629	366,660
15. Nivernais	38. Nièvre	2,658	323,783
16. Bourbonnais	39. Allier	2,848	422,024
17. Marche	40. Creuse	2,163	277,831
18. Berry	41. Cher	2,819	345,543
	42. Indre	2,664	288,788
19. Limousin	43. Vienne (Haute)	2,119	381,753
	44. Corrèze	2,272	318,422
20. Auvergne	45. Cantal	2,229	230,511
	46. Puy-de-Dôme	3,090	544,194
21. Lyonnais	47. Loire	1,852	647,633
	48. Rhône	1,104	843,179
22. Burgundy	49. Ain	2,248	350,416
	50. Saône-et-Loire	3,330	620,360
	51. Côte-d'Or	3,391	361,626
	52. Yonne	2,892	321,062

FRANCE.

Old Provinces.	Departments.	Area in Eng.sq. Miles.	Population in 1901.
23. Franche Comté	53. Saône (Haute).....	2,070	266,605
	54. Jura.....	1,951	261,288
	55. Doubs.....	2,052	298,864
24. Alsace (part of)...	56. Belfort, dist. of....	235	92,304
25. Dauphiné.....	57. Isère.....	3,178	568,693
	58. Drôme.....	2,532	297,321
	59. Alpes (Hautes)....	2,178	109,510
26. Languedoc.....	60. Ardéche.....	2,144	363,501
	61. Loire (Haute).....	1,930	314,058
	62. Lozère.....	1,996	128,866
	63. Gard.....	2,270	420,836
	64. Hérault.....	2,402	489,421
	65. Tarn.....	2,231	332,093
	66. Garonne (Haute)...	2,457	448,481
	67. Aude.....	2,448	313,531
27. Guienne	68. Aveyron.....	3,385	382,074
	69. Lot.....	2,017	226,720
	70. Dordogne.....	3,550	452,951
	71. Tarn-et-Garonne...	1,440	105,669
	72. Lot-et-Garonne....	2,078	278,740
	73. Gironde.....	4,140	821,131
28. Gascony.....	74. Landes.....	3,604	291,586
	75. Gers.....	2,428	238,448
	76. Pyrénées (Hautes).	1,750	215,546
29. Bearn and Navarre.....	77. Pyrénées (Basses)..	2,977	426,347
30. Foix.....	78. Ariége.....	1,892	219,641
31. Roussillon.....	79. Pyrénées(Orientales)	1,598	212,121
32. Avignon, Venaissin, and Orange	80. Vaucluse.....	1,381	236,949
33. Provence.....	81. Rhône(Bouches-du-)	2,025	734,347
	82. Alpes (Basses).....	2,697	115,021
	83. Var.....	2,333	326,384
34. Corsica.....	84. Corse.....	3,367	295,589
35. Savoy.....	85. Savoie.....	2,388	254,781
	86. Savoie (Haute)....	1,774	263,803
36. Nice.....	87. Alpes Maritimes...	1,443	293,213
	Total.....	207,054	38,961,945

By the treaties with Germany 1871, France lost 5,589 sq. m. of land, and 1,597,228 inhabitants, comprised within 1,689 communes, and distributed over five departments. These losses included the whole of the old dept. of the Bas-Rhin, two arrondissements with a fraction of the third (Belfort) of the dept. of the Haut-Rhin, the greater portion of the dept. of the Moselle, together with a number of canton and communes in the dept. of the Meurthe and Vosgess. The portions of the two depts. of the Meurthe and Moselle remaining to France have been incorporated into one.

Colonies and Foreign Possessions.—The possessions of France beyond Europe cover an area of 4,072,076 sq. m., including protectorates and spheres of influence, and including also Algeria, which is considered not as a colony, but as a part of France. These foreign possessions are vast in extent and population, and are rapidly increasing in value. Their external affairs are well managed and their business enterprises show a steadily increasing prosperity.

FRANCE.

AREAS AND POPULATIONS, ACTUAL AND ESTIMATED (1901).

Possessions.	Year of Acquisition	Area in Square Miles.	Population
In Asia:—			
India	1679	196	273,000
Annam	1884	52,100	6,124,000
Cambodia	1862	37,400	1,500,000
Cochin-China	1861	22,000	2,968,600
Tonking and Laos	1884–93	144,400	7,641,900
Total of Asia	.....	256,096	18,507,500
In Africa:—			
Algeria	1830	184,474	4,739,300
Tunis	1881	51,000	1,900,000
Western Sahara	.....	1,544,000	2,550,000
Senegal	1637-1880	80,000	1,800,000
Senegambia and Niger	1893	210,000	3,000,000
French Guinea	1843	95,000	2,200,000
Ivory Coast	1843	116,000	2,000,000
Dahomey	1893	60,000	1,000,000
Congo	1884	1,160,000	10,000,000
Somali Coast and Dependencies	1864	45,000	200,000
Reunion	1649	966	173,200
Comoro Isles	1886	620	47,000
Mayotte	1843	140	11,640
Madagascar	1643-1896	227,950	2,505,240
Total of Africa	.....	3,775,150	32,126,380
In America:—			
Guiana	1626	30,500	32,910
Guadeloupe	1634	688	182,110
Martinique	1635	380	203,780
St. Pierre and Miquelon	1635	92	6,250
Total of America	.....	31,660	425,050
In Oceania:—			
New Caledonia and Dependencies	1854-87	7,650	51,410
Establishments in Oceania	1841-81	1,520	29,000
Total of Oceania	.....	9,170	80,410
Grand Total	.....	4,072,076	51,139,340

Population.—For the elements that compose the French population, Celtic Gauls, Belgæ, Aquitanians or Iberians, Romans, Franks, and other Germanic tribes, and Normans, see the section below on the history of France, and separate titles, such as BELGÆ: FRANKS: etc. For the dominant language of France, see FRENCH LANGUAGE AND LITERATURE. For the Provençal language of the south of France, see that title. In the n.w. the ancient Celtic Breton tongue still survives (see BRETAGNE: CELTIC NATIONS); and in the s.w. the distinct and peculiar Basque language is spoken by the bulk of the people in more than one dept. (See BASQUE PROVINCES). Flemish is spoken in French Flanders; the Walloons (q.v.) speak their own Romance dialect in the n.e. of France; and

German is still spoken on the French borders of Alsace now incorporated with Germany. Of actual foreigner, resident in France 1901, there were in all 1.021,438; of whom 326,114 were Italians, 321,603 Belgians, 86,684 Germans, 79,548 Spanish, 70,677 Swiss, 36,224 Englishmen.—The pop. has not exhibited the same rate of increase as other first-class European powers during the present century, for while the pop. of Great Britain has nearly doubled within the last half century, that of France shows an increase of only about 12 per cent.

The following table shows the pop. 1801–1901:

Year of Census.	Number of Population	Annual Increase.
1801	27,349,003	149,941
1806	29,107,425	351,685
1821	30,461,875	90,292
1826	31,858,937	279,415
1831	32,569,223	171,787
1836	33,540,901	194,337
1841	34,217,719	135,362
1846	35,400,486	236,553
1851	35,783,170	76,537
1856	36,039,364	51,236
1861	37,382,225	268,572
1866	38,067,094	136,186
1872	36,102,921	
1876	36,905,788	128,310
1886	38,218,903	
1891	38,343,192	25,558
1896	38,517,957	174,765
1901	38,961,945	443,988

The decline of population between the census of 1866, May, and of 1872, May, was 1,964,273, of which 1,597,228 was due to the loss of the different territories annexed to the German empire. The remainder was due partly to losses in the war, and partly to actual decrease in the pop. of 73 departments. The greatest increase on record was in the period 1896–1901.

Chief Cities.—As in other European countries, the population of France is crowding together into the towns. In 1846, the rural population constituted 75·58 per cent. of the whole, the urban 24·42; in 1876, 65·10 and 34·90 respectively. Of the total increase of pop. 1876–86 more than two-thirds belonged to the 41 French towns of more than 40,000 inhabitants. The largest cities of France 1901 were:

Paris	2,714,068	Rouén	116,316	Tourcoing	79,242
Marseille	491,161	Reims	108,385	Montpellier	75,590
Lyon	459,099	Nice	105,109	Rennes	74,676
Bordeaux	257,638	Nancy	102,559	Dijon	71,326
Lille	210,696	Toulon	101,602	Grenoble	68,615
Toulouse	149,841	Amiens	90,758	Orléans	67,311
St. Etienne	146,559	Brest	84,284	Tours	64,695
Roubaix	142,365	Limoges	84,121	Le Mans	63,272
Nantes	132,990	Angers	82,398	St. Denis	60,808
Le Havre	130,196	Nimes	80,605	Calais	59,743

Coast, Islands, and Frontier.—The n.n.w. coast is generally irregular, indented with numerous bays, the principal of which is the Bay of St. Malo, the archipelago of Bréhat, etc. The w.s.w. coast is more lofty and precipitous, and is interspersed with isolated rocks and promontories; while s. of the Loire it is low, and lined with salt marshes to the

foot of the Pyrenees, where it again assumes a rocky character. Here lie the islands of Ushant (Ouessant), Belleisle, Noirmoutier, Isle d'Yeu, Ré, Oléron, etc. The coast of the Mediterranean, which is broken by lagoons or shore-lakes, is low till it has passed Toulon, after which it becomes bolder. The only islands off the shore are the Hyères, near Toulon; the larger island of Corsica (q.v.) lies n. of Sardinia. The Mediterranean here forms two bays or gulfs, the Gulf of Lyons and the Gulf of Genoa which belongs only in part to France. The land frontiers of France are formed on the side of Spain by the Pyrenees; on that of Italy and Switzerland, by the Alps and Jura chain; on the n.e., the frontier line is unprotected by natural boundaries, and since the loss of Alsace and Lorraine is not defended by the same celebrated fortresses as before the war of 1870–1. Other military defenses however have been provided.

Plains, Mountains, and Rivers.—The chief plains are those of Burgundy, and of the oceanic district, embracing the lower basins of the Seine, Loire, and Garonne. France has four great mountain chains—the Pyrenees (q.v.), which separate the French territory from Spain; the Cevenno-Vosgian range, formed of the Cevennes (q.v.), running e. and w. between the Rhone and Loire, and the Vosges, running n. and s. between the Moselle and the new boundary line; the Alps (q.v.), which separate the Swiss territory from the provinces of Savoy and Nice; and the Sardo-Corsican range, which belongs, as the name implies, to the islands of Sardinia and Corsica. The highest peaks in the Pyrenees are the Maladetta and Mont Perdu (10,886 ft and 10,994 ft.); in the Cevenno-Vosgian range, the greatest height (the Widderkalm) does not greatly exceed 7,000 ft. The French portion of the Alps now includes several of the highest mountains and most elevated passes of the range, as Mont Blanc, 15,744 ft.; Mont Isèran 13,272 ft; Mont Cenis, 11,457 ft.; and the pass of Little St. Bernard, 7,190 ft. etc. In Corsica, the highest peak rises to an elevation of 9,000 ft. The grand water-shed of France is the Cevenno-Vosges chain, which determines the direction of the four great rivers, the Seine, the Loire, the Garonne, and the Rhone; the first three of which flow n.w. into the Bay of Biscay or the English Channel, and the fourth into the Gulf of Lyons. Besides these, the more important streams are the Moselle, Meuse, and Scheldt or Escaut (all of which soon leave France, and flow into the Netherlands, or Germany); the Somme and Orne (belonging to the basin of the Seine); the Vilaine and the Charente (belonging to the basin of the Loire); the Oise, the Aube, the Yonne, and the Marne, chief affluents of the Seine; the Sarthe, the Loiret, the Allier, and the Maine—of the Loire; the Dordogne, the Lot, the Tarn, and the Adour—of the Garonne; and the Saône, the Isère, and the Durance—of the Rhone.

The entire extent of river navigation in France amounts to 5,500 m., or 8,900,000 mètres, while the 99 larger canals,

which have been constructed either to connect these river-courses or to supply entirely new channels of water-communication, extend over a length of 2,900 m., or 4,700,000 mètres. The most important of these works are the canals connecting Nantes, and Brest, and the Rhone with the Rhine, and those of Berry, Nivernais, and Bourgogne. France contains only one lake of importance, Le Grand-Lieu, a little s. of Nantes, which has an area of about 14,300 acres; but the country abounds in salt marshes or ponds, especially in the districts of Gascony, Rousillon, and Languedoc.

France is peculiarly rich in mineral springs, of which there are said to be nearly 1,000 in use. Of these, more than 400 are in the group of the Pyrenees, where there are 93 establishments for their systematic use. It is estimated that there are, moreover, fully 4,000 springs not hitherto employed.

Geology, etc.—France presents a great variety of geological formations, but though there is an almost complete succession of all the stratified and non-stratified formations, they are distributed with great inequality: For instance, while nearly one-third of the soil is composed of tertiary formations, a very small fractional part is made up of coal-beds. A belt of primary rocks, forming the skeleton of some portions of the Vosges, Alps, and Pyrenees, and of the great Plateaux of Brittany and La Vendée, encircles the great central basin in which rises the volcanic formation of the mountains of Auvergne, with their extinct craters, lava streams, etc. The space between this external breast-work and its volcanic nucleus is occupied by secondary and tertiary formations. Alluvial deposits are in all the valleys, but they occur in extensive beds only in the neighborhood of Dunkirk and Niort, and on the borders of the Mediterranean. According to M. Maurice Block's estimate, the physical and agricultural character of the soil of France may be comprised under the following heads:

	Hectares.
Mountainous districts, heaths, and commons	9,944,839
Rich land	7,276,369
Chalk or lime districts	9,788,197
Gravel, stony, and sandy	15,951,618
Clay, marshy, miscellaneous	9,807,577
	52,768,600

The same writer further subdivides the soil of France according to its actual employment under the following heads:

	Per cent. of the whole area.
Arable lands	48.3
Meadow lands	9.7
Vineyards	3.7
Cultivated lands	17.8
Roads, streets, public walks, etc.	3.7
Forests and unproductive lands	16.8

Climate.—France has one of the finest climates in Europe, though, owing to its great area, it has considerable

diversities of temperature; for instance, the n.e. parts have a continental, and the n.w. parts an oceanic climate, resembling those of Germany and Great Britain; while the Mediterranean districts are exposed at times to the ravages of the burning winds which have passed over the deserts of Africa, and to the destructive n.w. wind known as the *mistral*, which often does great injury to the fields near the mouths of the Rhone and Var. The mean annual temperature of different parts of France has been estimated as follows by Humboldt: Toulon, 62° F.; Marseilles, 59.5°; Bordeaux, 56°; Nantes, 55.2°; Paris, 51.2°; Dunkirk, 50.5°.

Products.—Of the vegetable products of France, the most generally cultivated are the cereals, the vine, chestnuts, olives, culinary fruits and vegetables, hops, beet-root for the manufacture of sugar, tobacco, madder, chicory, flax, etc. The dairy industry has increased considerably and flourishes especially in the northern departments, where the products are exported to England. Whereas formerly large quantities of butter were imported, the exports of butter and cheese now reach as high as from 78 to 90 millions of francs annually. Cereals are largely imported; their cultivation increased from 1845 to a maximum in 1890, since when there has been a gradual decline along all lines, typified in 1903, by wheat 6,475,728 hectares, rye 1,297,227 hectares, barley and oats 4,540,839 hectares. This table shows the fluctuations during the period of increase.

EXTENT OF LAND OCCUPIED IN 1845, '79, '90, AND '94 (IN HECTARES).

	1845.	1879.	1890.	1894.
By Wheat.....	5,743,135	6,920,000	7,061,739	6,991,449
" Rye.....	2,500,000	2,100,000	1,588,632	1,555,723
" Barley and Oats..	1,200,000	5,103,000	4,658,254	4,771,713
" Maize.....	730,000	610,000	595,021	578,275
" Potatoes.....	925,000	1,266,000	1,464,757	1,540,521

QUANTITY YIELDED IN 1845, '79, '90, AND '94 (IN HECTOLITRES).

	1845	1879	1890	1894
By Wheat....	71,963,280	80,900,000	116,915,880	122,469,207
" Rye.....	30,000,000	24,000,000	24,170,317	26,406,900
" Barley and Oats....	18,400,000	92,000,000	110,792,568	108,953,142
" Maize.....	8,000,000	7,600,000	8,964,915	9,662,407
" Potatoes...	77,900,000	102,000,000	110,397,993*	128,200,939*

* Quintals.

The mean annual yield of these productions is estimated as follows: Wheat, 73,000,000 hectolitres; rye, 22,000,000 hectolitres; barley and oats, 40,000,000 hectolitres; maize, 9,100,000 hectolitres; potatoes, 95,000,000 hectolitres. (The hectolitre = 2.75 bushels.) The subdivision of farms, the short leases (less than 10 years) on which the majority are let, and the small number of the great landowners who reside on their estates, have tended to check the progress of agriculture in France. Agricultural exhibitions have been held since 1850. 360,000 francs are annually given in prizes, etc; and there are now one thousand agricultural associations in different parts of France.

The manufacture of sugar from beet-root, which origina-

ted early in the 19th century, reached a maximum output in 1901–02 of 1,051,930 tons, since when there has been a falling off to 562,736 tons in 1904–05. After the appearance of the vine disease, beet-root was employed in the manufacture of alcohol, and this probably explains the decrease in sugar production. From 1,886,754 hectolitres of alcohol in 1902, the product reached 2,257,248 hectolitres in 1904. Beet cultivation is almost limited to the n. and e.; hemp and flax are grown chiefly in the northern, and also in the s.-western departments. The annual production of hemp now varies; seed from 49,185 hectolitres to 91,460 hectolitres, fibre from 153,626 hectolitres to 200,000 hectolitres, of flax seed from 114,259 hectolitres to 155,195 hectolitres, of flax fibre from 179,730 hectolitres to 248,036 hectolitres. During the five years 1900-04 the value of foreign flax imported ranged from 122,100,000 of francs in 1903, when the native yield was at its minimum, to 55,100,000 of francs in 1904. The cultivation of the mulberry-tree is important in the production of silk, which, beginning in the 17th c., in 1790 had reached such dimensions that the produce then was 6½ million kilogrammes of cocoons, worth 16½ million francs. From 1840–53, the production increased from 17 to 26 millions of kilogrammes; but the diseases to which the silkworm has since been liable so much reduced the yield of silk that in 1857 it hardly amounted to 7 millions of cocoons. The disease has, however, gradually abated. Over 120,250 persons are employed in silk culture industry and the annual production of cocoons is about 6,000,000 kilogrammes; cocoons are exported to the annual value of about 2,600,000 francs.

The vine has, from a very early period, been one of the principal sources of the agricultural wealth of France. The choicest wines are grown in the Bordelais, Burgundy, and Champagne, but some excellent kinds are produced on the banks of the Loire and in some of the s. departments. The breadth of soil devoted to this culture fluctuates, but may be stated at about 2,000,000 hectares. The fungus known as oïdium attacked the vines and inflicted such serious damage on the plant, that in 1854 (the worst year) the hectare yielded 5 hectolitres instead of the average 23 hectolitres. A new and destructive disease, occasioned by an insect called the *Phylloxera vastatrix*, appeared in the s.e. of France 1865, and by 1873 had established itself in 12 departments. In 1877, 28 depts. had suffered; and in 1880, more than 40. Energetic measures overcame the evil by 1900, as shown in the following annual yields of wine:

	Hectolitres.		Hectolitres.
1808	28,000,000	1877	56,000,000
1848	51,622,150	1880	29,000,000
1874	63,146,000	1901	60,074,110

The average yearly produce of the vineyards of France is estimated at about 50 million hectolitres (about 1,000 million gallons). Of this, about ⅐ is made into brandy. Frances consumes nearly all the wine raised on her soil,

the annual exports being on an average little more than 2 millions of hectolitres, valued at about 218 millions of francs.

The principal forest-trees are the chestnut and beech on the central mountains, the oak and cork trees in the Pyrenees, and the fir in the Landes. The destruction of the national forests has been enormous within the last two centuries, but measures have been taken in recent years to plant wood to protect mountain slopes exposed to inundations from alpine torrents, and to provide a supply for the ever-increasing demand of wood for fuel. About one-seventh of the entire territory of France is still covered with wood. Turf taken from the marshy lands is extensively used, especially in the rural districts, for fuel.

Animals.—France is not so well stocked with domestic animals as her great resources might indicate. During the 50 years 1812–62 the numbers of horned cattle were almost doubled. In 1901 there were in France in exact numbers, 2,026,382 horses, 554,952 asses and mules, 14,673,810 horned cattle, 19,669,682 sheep, 6,758,198 swine, and 1,529,280 goats. Bee and honey culture employ 2,000,000 hives, the annual produce of which has a total value of about $3,000,000. Poultry is an important item of farm produce in France, estimated at 45 millions of francs; while the eggs and feathers yield 35 millions of francs. The wild animals are fast diminishing; the lynx is rarely seen, even among the higher alpine regions, but wolves are still numerous in the mountainous districts of the central depts.; while the chamois and wild-goat, as well as the marmot, ermine, and hamster, are found among the Pyrenees, Alps, and Vosges. The wild-boar, roebuck, fox, squirrel, polecat, and marten are found in the woods. The red and fallow deer are scarce; hares and rabbits abound; and game generally is plentiful. The wanton destruction of small (singing) birds having been found conducive to the excessive increase of noxious insects, stringent municipal enactments are being put into force for the protection of those birds.

Fisheries.—The French govt. expends between three and four million francs annually in aiding those engaged in the great fisheries. The value of the exports of fish from France (12 million francs) is little more than half the value of the imports. There are no official reports of river and other fresh-water fishing in France; or of the minor fisheries along the coasts, which constitute the principal means of occupation and support of the majority of the local population. Pilchards and mackerel are caught in large quantities off Normandy and Brittany. The w. coasts have extensive oyster and mussel beds; tunnies and anchovies are caught on the shores of the Mediterranean. The total catch of the French fisheries, 1901, was 402,304 metric quintals. French boats fish in the North Sea and along English e. coast, at the Newfoundland fisheries, and off the coast of Iceland. Pisciculture (q.v.) is successfully prosecuted in France. About 85 per cent. of French

oysters are derived from four or five breeding-grounds. Nearly 100 million oysters are annually produced.

Mineral Products.—The chief mineral products are coal and iron, on which about 250,000 men are employed. France has several considerable coal-beds, principally in the e.s.e. and north. The coal supply hitherto has not equalled the demand; though in several years of the decade 1870–80, it rose to the enormous amount of 170 million quintals. (The quintal = 1.97 cwt.). Notwithstanding this home-supply, it was necessary to import many million quintals to meet the increased annual demand, which before the late war, had risen above 200 million quintals, while in 1852 it was still under 120 millions. The iron mines of France are of excellent quality, but their distance from the fuel necessary for the working of the mineral renders them of relatively small value. In 1900 there were 511 mines in operation, 180,976 workers; the product was: coal and lignite, 33,404,298 tons; iron ore 5,447,694 tons; pig iron, 2,714,298 tons; finished iron, 708,274 tons; steel 1,226,537 tons. France imports iron from Switzerland, Germany, Belgium, and England. Argentiferous galena, a little silver and gold, copper, lead, manganese, antimony, and tin occur, but hitherto their working has not proved productive. The dept. of Charente-Inférieure yields the largest amount of salt, the mean annual produce being $1\frac{1}{2}$ million quintals ($2\frac{1}{2}$ million francs), fully one-third of the entire annual product of the country. France derives about 41 million francs from its quarries of granite and freestone, its kaolin, marbles, sands, lithographic stones, millstones, etc. Granite and syenite are found in the Alps, Vosges, Corsica, Normandy, and Burgundy; porphry in the Vosges, and basalt and lava for pavements in the mountains of Auvergne. Marble is found in more than 40 depts., alabaster occurs in the Pyrenees; the largest slate-quarries are near Cherbourg and St. Lô.

Industry, Trade.—The principal seats of industry are as follows: For textile fabrics, the depts. Le Nord, La Sarthe, Maine-et-Loire, Seine-Inférieure, Le Calvados, Seine-et-Oise, Ille-et-Vilaine, etc. France is unrivalled for silk-manufactories, the finest of which are at Lyon, Tours, and Paris; while St. Etienne is the special seat of the ribbon trade. Alençon, Bailleul (fabricating the so-called *Valencienne*), Lille, Arras, Caen, and Bayeux, all are famous for their laces and blonds, which alone employ 250,000 persons. Rheims is conspicuous for *merinos* and fine flannels; Amiens and Nancy for fine printed woolen goods; Lodève and Elbœuf for army cloths. Gloves are made at Grenoble, Paris, etc. The best carpets are made at Aubusson, Abbeville, and Amiens. Paris is the seat of industry for some of the most costly fabrics, as Gobelins tapestry, shawls of great value, watches, clocks, articles of *vertu*, carriages, philosophical instruments, etc. Sèvres is unrivalled for china and glass. St. Gobain and St. Quirin manufacture looking glasses of the largest size.

The following list gives an approximative estimate of the value of the chief products of French industry:

	Millions of Francs.
Linen fabrics	250
Cotton "	650
Woolen "	950
Silk "	1000
Mixed "	330
Jewelry, watchmaking	35
Gilt-wares	12
Minerals, mines, salt, etc	600
Articles of food—as sugar, wines, etc	364
Skins, leather, oils, tobacco	556
Bone, ivory, isinglass, etc	30
Chemical products	80
Ceramic arts	86
Paper, printing	60
Forests, fisheries	98

The trade of France is inferior only to that of England and the United States. The great emporiums of trade are Paris, Lyon, St. Etienne, Lille, Rheims, Nimes, Toulouse, St. Quentin, Orleans, Avignon, Montpellier, etc.; and the most active maritime ports are Marseilles, Cette, Havre, Bordeaux, Nantes, Rouen, Calais, Dunkirk, Boulogne, Dieppe, etc. These centres of trade all suffered at different periods during the last century.

In French statistics general commerce includes all goods entering or leaving France, while special commerce includes only imports for home use and exports of French origin. In 1904 the general commerce amounted to 8,057,000,000 francs, of which 4,072,000,000 francs represented imports and 3,985,000,000 francs exports. The special commerce amounted to 8,011,000,000 francs, of which 4,536,000,000 francs represented imports and 4,475,000,000 francs exports. In 1905 the total foreign commerce of France, not including the colonies or other possessions, aggregated $1,861,634,000, of which $922,329,000 represented imports and $939,305,000 exports. In 1906 the imports from the United States amounted to $97,892,480 and the exports to the United States amounted to $108,415,350. The principal sub-divisions of the commerce average about as follows: Imports, food products, $156,000; raw products, $562,600,000; manufactured goods, $154,400,000. Exports, food products, $149,000,000; raw products, $203,600,000; manufactured goods, $450,000,000. The leading articles of export from France are silk manufactures, woolen manufactures, sugar, butter, cheese, eggs, wine, etc.

Merchant navy of France numbered (1901) 1,299 steamers, of 546,541 tons, and 14,393 sailing vessels, of 564,447 tons; 107,215 vessels of 26,016,882 tons entered French port, of which 20,340 were foreign vessels. Internal and coasting trade is a great source of wealth to the state.

Railways, etc.—According to the official report the railways in operation in (1906) measure 29,018 m., including those owned by the government. The railways of France are for the most part held by private corporations, under the superintendence of the state, from which they receive subsidies of about $100,000,000. In 1904 the length of line of 'general interest' open for traffic was 24,357 m.,

which cost to construct $3,488,400,000. The receipts during that year were $303,000,000, and the expenses, $157,400,000. Number of kilometric passengers carried 13,699,000,000; total amount of freight 16,551,000,000 kilometric tons. There are about 2,500 miles of street railways.

By a law of 1842, the construction of railways was left mainly to companies, superintended, and if necessary assisted by the state. The state now constructs lines which the companies work, and operates an important state system on its own account. By a clause in the treaty of 1871, the whole of the lines of the Eastern Company in Alsace-Loraine were sold to Germany.

The creation of the first highroads in France is referred to Philippe Auguste; and their more perfect organization in the 16th and 17th c., to Henry IV. and Louis XIV. Under Napoleon I. there were 125 highroads, extending in all over 30,000 kilomètres (18,600 m.); and in 1901 there were more than 38,200,000 k. (23,910 m.) of national roads.

Postal Service.—The postal service dates back to 1464, when Louis XI. placed it under the direction of the state. Since 1848, a system of low prepayment for letters has been established. In 1905, there were in France 11,920 post-offices; the postal receipts were about 300,000,000 francs, expenditure (including telegraphs), 225,000,000; letters carried 1,119,488,834; printed matter, samples, etc., 1,463,024,819.

Electric Telegraph.—The first electric telegraph in France was constructed 1844. In 1880, there were 41,-220 m. of lines, including submarine and subterranean lines. In 1905 the total length of telegraph lines was 97,-941 and of wire 369,851 m.

Constitution, Government.—1870, Sep. 4, the emperor, Napoleon III., was declared no longer the head of the state, and France was proclaimed a republic. At the close of 1872, the supreme power was vested in a National Assembly. By the law of 1875, Feb. 25, the National Assembly consists of two bodies—the Chamber of Deputies and the Senate. All deputies are elected for four years by universal suffrage, on the same day, one deputy being named for each arrondissement; but when an arrondissement exceeds 100,000 inhabitants it is divided into electoral districts, thus bringing the present number of deputies up to 583. The Senate is composed of 300 members elected from each department, their number varying from 2 to 10 according to the population. Deputies receive 15,000 francs salary and senators 9,000. Since 1884 all senators have been elected, the 75 life-senators appointed by the Senate and created by the constitution having then been suppressed. Senators are elected for nine years, some of their number being renewed every three years. The suffrage is called *limited*, the electoral body being formed of it: (1) the *departmental representatives* (senators, deputies, general councillors);

(2) *senatorial delegates* elected from among the voting citizens of each township by the municipal council and varying from 1 to 24 according to population. These senatorial electors form a college that meets at departmental headquarters under the presidency of a civil magistrate. Three ballots are cast and the election must end on the day of the third ballot. The first two ballots are cast to find an absolute majority if possible, and failing in that the third ballot is taken to find a majority of votes cast. Hence the Chamber of Deputies represents the people as a whole and the Senate localities.

The executive power is vested in the President and his ministers. The President is elected from among its own members by Congress (Deputies and Senate combined) for a term of 7 years and has power to appoint judges, make appointments to all civil and military offices, command the armed forces, maintain relations and settle treaties with foreign states, and introduce, promulgate and execute laws. These powers, however, he can exercise only through his ministers, so that the power of the President is practically reduced to the appointment of his ministers. He is politically irresponsible and can be summoned before the High Court only for felony. His salary was fixed in 1873 at 600,000 francs with an extra allowance of as much more for household expenses and official entertainment. The presidents of the Republic have been as follows: M. Thiers 1871–3; Marshal MacMahon 1873–9; F. J. P. Jules Grévy 1879–88 (the only one re-elected); Sadi Carnot 1888–94 (assassinated 1894, June 25); Jean Casimir-Périer 1894, June–1895, Jan.; Félix Faure 1895–9; Emile Loubet 1899–1906; Armand Fallières 1906–.

The Ministers form a jointly responsible cabinet under the President of the Council, who is appointed by the President of the Republic, and is free to choose his colleagues. The cabinet consists of the Ministers of Justice, Public Instruction, Interior, Colonies, Foreign Affairs, War, Navy, Public Works, Commerce, Finance, and the Labor (the last created in 1907). They are responsible to both Chambers for their acts.

Administration of Justice.—In accordance with the general arrangement which divides the whole country into departments, each department into arrondissements, each arrondissement into cantons, and each canton into communes, there is a series of courts, commencing with the lowest of these divisions, and rising above each other in regular order. First, each commune has a justice of peace, who judges in petty causes, but whose more appropriate function is understood to be to act as a kind of umpire between parties at variance, and induce them to settle their differences without proceeding to formal litigation. If the attempt at conciliation fails, the complainant brings his action before a court which, from being that in which the action must originate, receives the name of court of primary or first jurisdiction.

Every arrondissement has such a court, and has, moreover, if any more important trading town is situated within it, a *tribunal de commerce*, to which mercantile and commercial causes are appropriated. It has also, occasionally, a court called *conseil de prud'hommes*, in which persons of skill and character, not vested with ordinary legal functions, settle disputes on principles of equity, and pretty much in the character of arbitrators. From these courts of primary resort an appeal lies to a number of courts called *cours d'appel*. They are in all 27, and have each jurisdiction over several departments. These courts generally hold their sittings in the most important town situated within their jurisdiction. The *tribunaux de commerce* in the most important commercial and manufacturing towns consist of members who are elected by the chief business men of the respective places. Above all these courts, and properly the only supreme court of the state, is the *conseil supérieur* or *cour de cassation*, so called from its power of reviewing and annulling the decrees of inferior courts.

Religion, Churches.—No religion is recognized by the state. According to a law promulgated 1905, Dec. 9, the churches are separated from the state, but the adherents of all creeds may form *associations culturelles*—associations for public worship and the state, the Departments, and the Communes are relieved from payment of salaries. Prior to 1906, recognized forms of faith were the Rom. Cath., Prot. (including the Reformed and Lutheran), the Jewish, and, for Algeria, the Mohammedan. The clergy of these religions were paid by the state. The Rom. Cath. Church comprises the great majority of the people, 78.50 per cent. Of the total pop. Protestants number 1.8 per cent., mostly Calvinists, with some Lutherans; 53,500 are Jews; and no less than 7,685,000 persons 'decline to make any profession of religious belief.' There are further 33,000 of 'various creeds.'

The state appropriated the funds of the church in 1789, and undertook to maintain public worship. In 1803, the maintenance of religion cost 4,100,000 francs; in 1813, 17,000,000; in 1854, 44,000,000. In 1900, the sum for France proper was 43,006,978, thus apportioned: for Rom. Cath. Church, 41,045,923; Prot. Churches, 1,495,-100; Jewish worship, 206,530; for Algeria: Rom. Cath. 829,700; Prot., 97,600; Jews, 28,970; Mussulmans, 307,-430; total, 44,270,678. The archbishops and bishops of the church of France were nominated by the pres. of the republic, and canonically inducted by the pope. There are 84 Rom. Cath. prelates—17 archbishops, 67 bishops. The abp. of Paris received 50,000 francs per annum; the other archbishops, 20,000 francs; the bishops, 15,000 francs. Several French prelates hold the rank of cardinals; and there are over 750 canons belonging to the various cathedral chapters. About 3,500 *curés* or parochial clergy (receiving from 1,200 to 1,500 francs) are inducted by the bishops, with approval of the state; there are also 10,000 *vicaires* (curates), and 30,000 *desservants*.

In 1900 the National Assembly adopted a measure known as the Associations Law. Its purpose was to compel all religious orders to apply for authority to conduct schools. In 1902 about 3,000 schools, mainly for girls, and taught by nuns, still defied the law. A decree, therefore, was issued ordering these to close within a week, or the troops would close them. Considerable violence resulted in different parts of France, particularly in Brittany, before the decree was finally carried out. The abp. of Paris and many bps. made vigorous protests.

Political Parties.—The names adopted by the sections of the legislative assembly 1791 (see ASSEMBLY, NATIONAL) from the part of the house in which they sat, have, with modifications, been retained in France, and extended to parliamentary parties in Germany, and other countries. Those sitting on the 'Extreme Right' and the 'Right' of the president's chair were representatives of the burgher interest and Constitutionalists like the Feuillans (q.v.), and supported the king as far as they could. The 'Left' was composed of the Girondists (q.v.), moderate republicans who favored the constitution as it stood. The 'Extreme Left,' sat on the higher benches, and was nicknamed the 'Mountain;' it comprised representatives of the advanced clubs, Robespierre of the Jacobins (q.v.), and Danton of the Cordeliers (q.v.). The 'Centre' was devoid of definite principle, usually voting with the left. Under Louis Philippe, there were four parties—the Right or strong Conservatives under Berryer (q.v.); the Right Centre under Guizot (q.v.); the Left Centre under Thiers (q.v.); and the Extreme Left under Odillon Barrot (q.v.). Under the Third Republic, the Anti-Republicans are Extreme Right, Right, and at times Right Centre, and comprise the High Conservative Legitimists, or followers of the older branch of the Bourbon (q.v.) House, with the Ultramontanes; the Orleanists or supporters of the House of Orleans (q.v.), now practically united with the Legitimists since the death of the Comte de Chambord; with them also the Bonapartists usually vote. The Left Centre and Left are Republicans more or less friendly to the govt., with Opportunists, etc.; and those of very extreme opinions, inclined to sympathy with Communists and Socialists, are the Extreme Left.

Public Instruction.—Public instruction is under the control of a special ministry consisting of the Minister of Public Instruction, as the supreme authority, and the directors of the three departments of superior, secondary and primary education. They are also helped by several deliberating assemblies of professors and officials, such as the University Council and the Committee of Public Instruction. Directly representing the central power are 15 rectors residing in the university towns who supervise all educational matters in their academy (or academic province). Each academy possesses its Council of professors. Under the rector are Academy Inspectors who supervise secondary and primary instruction and under

them in turn are Primary Inspectors who superintend the primary schools.

Primary education is compulsory for all children from 6 to 13 years of age; and in government schools is gratuitous; instruction is given in 67,340 schools, with 100,913 teachers and 3,671,727 pupils. There are also about 350 'superior primary schools,' for more advanced study. For private education there are 14,331 schools, 41,747 teachers and 925,301 pupils. Secondary education is given to boys in 106 lycées and 246 colleges, the former being properly public schools with an average attendance of 500, whereas the latter are municipal institutions with an average attendance of only 200. There are also many lycées and colleges for girls who desire to be educated outside a private institution or a convent. For higher education there are 16 Universities as follows in order of their foundation: Montpellier (1125); Paris (1150); Toulouse (1230); Grenoble (1339); Aix-Marseilles (1409); Caen (1431); Poitiers (1431); Bordeaux (1441); Besançon (1485); Nancy (1572); Dijon (1722); Rennes (1735); Lyon (1808); Lille (1808); Clermont (1808); and Algers (1849). A university consists of four faculties: Letters, Sciences, Medicine, and Law; at the head of each faculty is a dean elected by the professors and placed immediately under the rector of the university. There are also the superior medical schools of Amiens, Angers, Limoges, Nantes, Reims, Rouen, and Tours. The University of Paris is not limited to the four faculties that have the Sorbonne for their centre, but it also includes such establishments as the College de France, Ecole des Chartres, Museum, Ecole des Hautes Etudes, and Ecole des Langues Orientales, and also has affiliated with it (though all are not under the authority of the Minister of Public Instruction) the Ecole du Louvre, Ecole des Beaux-arts, Ecole des Arts Décoratifs, Conservatoire, Ecole Superieure des Mines, Ecole des Hautes Etudes Commerciales, and Ecole des Sciences Politiques. There are numerous agricultural, forest, farming, and veterinary schools, the Ecole Polytechnique (q.v.), and other military and naval colleges. The state appropriation to the ministry of public instruction is about $45,000,000. The modern 'University of France' is no longer an independent organization but is directly administered by the state.

Literary and Scientific Institutions.—Foremost is the Institute of France (q.v.). The Museum of Natural History is one of the finest in the world. The Bureau des Longitudes and the Observatoire, at Paris and Marseille, are famous. These and other establishments all are maintained at the cost of the state; as are also the great libraries, notably the Bibliothèque Nationale (see LIBRARIES). There are public libraries in the provinces also. France is rich in public galleries of painting, statuary, and articles of *vertu*, that of the Louvre being the most noted. See Paris.

Theatres.—The theatre, like all other public institutions,

is under the surveillance of the state, which contributes to the maintenance of the drama. See COMÉDIE FRANÇAISE.

Charitable Institutions.—France is rich in institutions of charity, many of which are remnants of the old system of church relief; but the *crèches*, which are, in fact, free nurseries, are a modern form of charity, which originated (1844) with M. Marbeau at Paris: see FOUNDLING HOSPITAL. The public hospitals and infirmaries are maintained by special endowments, a percentage on the receipts at theatres and other places of amusement, and by subsidies from the govt. and local communes. Public charities for the relief of paupers derive their resources either from departmental or municipal funds, and are administered by the *bureaux de bienfaisance*, by the *dépôts de mendicité*, and by numerous other local institutions; besides which, the state contributes between 8 and 9 million francs for charitable purposes.

Taxation, Finances.—The public revenues are obtained from direct and indirect taxation, and comprised in the budget, voted by the National Assembly, under the heads of ordinary resources and special resources; the former including direct and indirect taxes, from stamps, the produce of forests, telegraphs, Algeria, etc.; and the latter, departmental funds, special imposts, etc. In 1906 the revenues amounted to $715,074,344 and the expenditures to $715,874,069.

Public Debt.—In 1814, the date of the Restoration, the interest of the debt was 63 million francs; under the Bourbons it rose to 200 millions; and 1830–48, Louis Philippe increased it to 244 millions. During the three years of the second republic, 5 millions were paid off; but the second empire (1852–69) added nearly 120 millions to the annual burden. The increase of the debt during the empire arose from a succession of loans raised by borrowing directly from the mass of small capitalists, without the intervention of large banking-houses. The amount of the national debt of France is very variously given according to what is included under that head. Leroy Beaulieu's calculation is 31,718,000,000 francs, and Camille Pelletan's 30,300,-813,594 francs nominal capital, and 22,824,043,690 francs actual. The loans and other obligations incurred to meet the expenses of the war of 1870–71, including the indemnity of 5 milliards of francs to Germany, nearly doubled this sum. The total expenditure arising from the war and the foreign occupations has been finally stated at 9,820 million francs; yet in spite of this enormous strain on the exchequer the national wealth of France has increased since the war. In 1876 provision had to be made for paying, as annual interest of the total debt, over 1,150 million francs. This was calculated to correspond to a capital sum of 23,403 millions (nearly 23½ milliards) of francs (=abt. 4,524 million dollars), which may be taken as approximately the total amount of the debt. In 1906 the funded debt amounted to 29,301,216,708 francs and the floating and unfunded debt to 1,401,081,031 francs or a total of nearly

$6,000,000,000 in United States money; the interest and other annual charges amounted to $237,855,497.

The continual deficits from the close of the first empire 1815 to the close of the second empire 1870, have been covered by loans, bearing interest or *rentes* at the rate of 3, 4, 4½, and 5 per cent. The budgets voted annually by the representatives of the nation have almost invariably shown a small assumed surplus; while the *compte définitif* for the corresponding period, when published some years afterward, has without exception exhibited a large deficit. The actual state of accounts with regard to national income and expenditure is not published till after the lapse of six or seven years. To the budget of 1903 was annexed a statement showing the deficits of the ordinary budgets from the period prior to 1814 down to the end of 1901, viz.:

Period.	Government.	Deficit (francs).
Before 1815	Napoleon I. and previously	99,678,480
1815-29	Louis XVIII. and Charles X.	269,801,915
1830-47	Louis Philippe	519,067,077
1848-51	Second Republic	29,399,140
1852-69	Napoleon III	93,921,998
	Total	1,011,868,611
1870-1901	Third Republic, surplus	22,874,106
	Total deficits	988,994,505

Banking.—There are two official banks—the Banque de France and the Crédit Foncier. There are also the so-called 'Haute-Banque' and other credit societies; credit establishments and discounting banks. The Banque de France has the official function of issuing bank notes, which are balanced in metal, the total in gold and silver now being about 4,000,000,000 francs and in bills, the amount which they represent varying from 5 to about 850,000,000 francs. The limit of circulation was raised in 1906 to 5,800,000,000 francs. Its capital is 182,500,000 francs in shares of 1,000 francs each and there are about 445 branches in the country. The Crédit Foncier, the governor of which like that of the Banque de France is appointed by the government, has a capital of 200,000,000 francs and its business consists especially of granting first mortgage loans to persons, villages, towns, and departments.

There are three great discounting banks in France—The Crédit Lyonnais, the Société Générale and the Comptoir National d'Escompte de Paris. Beside these great organs of credit there are (1) the coöperative banks; (2) the land and estate banks (*banques foncières*) operated in connection with the Crédit Foncier; (3) the postal transactions; (4) the savings banks; (5) the land credit establishments; (6) the *magasins généraux* for warranting goods; and (7) the colonial banks (semi-official), the most important of which are the Banque de l'Algérie and the Banque de l'Indo-Chine. No total of the transactions of French bank-

ing institutions can be given because of the secrecy prevalent among the bankers of that country. There is a clearing house in Paris but it is composed of only 13 members and the amount of business there does not represent by far the total transactions even of Paris.

Army.—Standing armies date in France from the time of Charles VII. The law of 1832 regulated the system of recruiting by conscription, on the footing which, with few modifications, it has subsequently occupied. By the law of 1872, substitution and enlistment for money are prohibited, and the principle of universal liability to arms is laid down, in accordance with which every Frenchman must be for 2 years in the 'active army,' 11 years in the reserve of the same, 6 years in the territorial army, and 6 years in the reserve of the territorial army. All privileges of exemption were abolished 1887, including those of pupils in clerical seminaries. The active army comprises 28,000 officers and *assimilés* (non-combatants ranking as officers, 528,000 corporals and privates and 123,000 horses. The *gendarmerie* is 24,000 strong, the infantry about 350,000; cavalry about 60,000; the artillery 72,000; engineering 13,000; train 6,800; and administrative 14,700. The staff of the army includes 110 lieutenants-general and 22 majors-general on the active list or unemployed.

Navy.—The inscription for the navy owes its systematic organization to the great minister Colbert (1681). At present all persons engaged in any maritime avocation between the ages of 18 and 50 are liable to inscription, but the service is compulsory for only 7 years, five of active duty and two of reserve. In 1907 the personnel of the navy staff consisted of 2,050 naval officers, 327 engineers, 153 naval shipbuilders, 27 hydrographers, 253 paymasters, 344 surgeons, and 54 apothecaries. There are also 364 reserve naval officers. The crews number about 53,000. The vessels of the navy in 1907 comprised 35 battleships (9 in reserve, 10 building); 26 armored cruisers (7 in reserve, 4 building); 25 1st, 2d and 3d class cruisers (14 in reserve); 58 torpedo-catchers (15 building); 30 gunboats (8 armored); 9 despatch boats; 9 torpedo gunboats; 40 sea-going torpedo-boats; 215 1st class torpedo-boats (70 building); 40 2d and 3d class torpedo-boats; 39 submarine boats (14 building); and 45 submersibles (the majority of which are in course of construction). There are also 12 iron-clad coast defense vessels, several transports, launches, etc.

For the money, weights, and measures used in France, see FRANC; METRE; LITRE; GRAMME. For further information on France, geographical and statistical, see Reclus's *Nouvelle Geographie;* Block's *Annuaire,* and his *Dictionnaire;* official publications, such as the *Annuaire Statistique de la France;* the *Almanach de Gotha, Statesman's Yearbook,* etc. See also many special titles in this work: as STATES-GENERAL; ASSEMBLY, NATIONAL; NATIONAL CONVENTION; DIRECTORY; GIRONDISTS; JACOBINS; GALLICIAN CHURCH; etc.; also the kings of France; ROBESPIERRE; NAPOLEON; etc.

FRANCE.

History.—France nearly corresponds with what the Romans knew as Gallia, or more precisely Gallia Transalpina, to distinguish Gaul proper from the Italian province on the Roman side of the Alps, occupied, after B.C. 3d c., by Gauls, and known as *Gallia Cisalpina:* see CELTIC NATIONS: ROME. Gallia Transalpina had, however, wider boundaries than modern France, and comprised the whole area between the Rhine, the Alps, the Mediterranean, the Pyrenees and the Atlantic. At the dawn of history, this area was occupied mainly by three races. In the s.w. were the Iberians or Aquitanians, a race whose ethnological position has never been certainly fixed, was easily and strongly distinguished from the others, and has usually been identified with the Basques still found n. and s. of the Pyrenees (see BASQUE PROVINCES: AQUITANIA). The Gauls in the centre, n., and w., were typical Celts (see CELTIC NATIONS); the Belgæ (q.v.), in the n. and n.e., were closely allied to the Gauls, and probably intermediate between them and the Germans. There were also some tribes of Germans, Ligurians, and Greeks, but the latter never penetrated far beyond the shores of the Mediterranean, where they planted colonies, the most important of which was Massalia (Marseilles). Under Augustus, Gaul was divided into four provinces, which, under subsequent emperors, were dismembered, and subdivided into seventeen. In the decline of the Roman power, Gaul was ravaged by neighboring hordes, and in the 5th c. it fell completely under the power of the Visigoths, Burgundians, and Franks. In A.D. 486, Clovis, a chief of the Salian Franks, raised himself to supreme power in the north. His dynasty, known as the Merovingian, ended in the person of Childeric III., who was deposed, 752, after the kingly power had already passed into the hands of the former, Maire du Palais, Pepin d'Heristal, and, after him, into those of Charles Martel and Pepin le Bref. The accession of Pepin gave new vigor to the monarchy, which, under his son and successor Charlemagne, crowned emperor of the West in 800 (768–814), rose to the rank of the most powerful empire of the West. Christianity, civilization, and letters were protected during his reign, and before his death he had stretched the limits of his empire from the Eider and the German Ocean to the Ebro and the Mediterranean, and from the Atlantic to the Baltic. With his death, however, this vast fabric of power crumbled to pieces, and his weak descendants completed the ruin of the Frankish empire by the dismemberment of its various parts among the younger branches of the Carlovingian family. Intestine wars desolated the land, and foreign assailants threatened it on every side. In 911, the ravages of the Northmen had assumed so persistent a character, that Charles le Simple was glad to purchase immunity from their encroachments by the cession of the territory subsequently known as Normandy. Anarchy reigned paramount; the various governors established a hereditary authority in their several governments, and the crown

was by degrees deprived of the noblest part of its appanages. The power of some of the vassals surpassed that of the kings; and on the death of Louis V. the Carlovingian dynasty was replaced by that of Hugues, Count of Paris, whose son, Hugues Capet, was elected king by the army, and consecrated at Rheims, 987. At this period, the greater part of France was held by almost independent lords, and the authority of the Capetian kings extended little beyond Paris and Orleans. Louis le Gros (1108–37) was the first of the race who reinstated order. He promoted the establishment of the feudal system, abolished serfdom on his own estates, secured corporate rights to the cities under his jurisdiction, and gave efficiency to the central authority of the crown. A greater degree of general order was thus secured, while a new element in the state was generated by the foundation of a free burgher class. Louis carried on a war against Henry I. of England; and when the latter allied himself with the Emperor Henry V. of Germany against France, Louis brought into the field an army of 200,000 men, whose ready appearance afforded the first instance of the existence of a common national feeling of patriotism, ready to respond to the appeal of the sovereign. The *oriflamme* is said to have been borne aloft for the first time on this occasion as the national standard. Louis VII. (*Le Jeune*), who took part in the second crusade (1137–80), was almost incessantly engaged in war with Henry II. of England. His son and successor, Philippe Auguste (1180–1223) recovered Normandy, Maine, Touraine, and Poitou from John of England, and increased the power of the crown in various other parts of France. He took an active personal share in the Crusades, and permitted the pope to organize a cruel persecution against the Albigenses in the southern parts of the country. Philippe was the first to levy a tax for the maintenance of a standing army, and in his reign a chamber of peers, of six secular and six ecclesiastical members, was instituted, to act as a council of state. Many noble institutions date their origin from this reign, as the University of Paris, the Louvre, etc. By the amendment of the administration of justice, the right of appeal to the royal courts was established, and the arbitrary power of the great vassals crippled. Improvements in the mode of administering the law were continued under his son, Louis VIII. (1223–26), and his grandson, Louis IX. (1226–70), who caused a code of laws (*Etablissements de St. Louis*) to be promulgated. St. Louis also effected many modifications in the fiscal department, and, before his departure for the Crusades, secured the rights of the Gallican Church by a special statute, in order to counteract the constantly increasing assumptions of the papal power. Under his son, Philippe III. (1270–85), titles of nobility were first conferred by letters-patent. He added Valois and the *comtés* of Toulouse and Venaissin to the crown. Philippe IV. (1285–1314), surnamed *Le Bel*, acquired Navarre, Champagne, and Brie by marriage. With a view of secur-

ing support against the secular and ecclesiastical nobility, with whom he was constantly at war, Philippe gave prominence to the burgher element in the nation, and 1302, Mar. 28, he, for the first time called together the *états généraux*, or general estates, at which the *tiers état*, or burgher class, appeared together with the nobles and clergy. These changes were, however, accompanied by arbitrary innovations in the fiscal and other departments of the government, which were effected with reckless haste and violence. With a view of securing to the crown the great fiefs, he abrogated the right of females to succeed to landed property. His tyrannical persecution of the Templars showed the extent to which the regal power could be stretched; and under his successors, Louis X. (1314–16), Philippe V. (1316–21), and Charles IV. (*Le Bel*), (1321–28) the last direct descendant of the Capetian line, the rule of the kings of France became even more unlimited, while the court was given up to every species of luxurious indulgence known to the age. Philippe VI., the first of the House of Valois (1328–50), distant relative of Charles IV., and nephew of Philippe IV., succeeded in right of the salic law. His reign, and those of his successors. Jean (1350–64) and Charles V. (*Le Sage*), (1364–80), were disturbed by constant wars with Edward III. of England, who laid claim to the throne in right of his mother, daughter of Philippe le Bel. The war began 1339; in 1346, the battle of Crécy was fought; at the battle of Poitiers (1356), Jean was made captive; and before its close after the death of Edward (1377), the state was reduced to bankruptcy, the nobility excited to rebellion, and the mass of the people sunk in barbarism. Falsification of the coinage, onerous taxation, and arbitrary conscriptions, brought the country to the verge of irretrievable ruin, while the victories of England humbled the sovereign, annihilated the French armies, and cut down the flower of the nation. The long and weak minority of Richard II. diverted the English from the prosecution of their groundless claims to the kingdom of France, which revived somewhat from the effect of its long and disastrous warfare; but during the regency for the minor, Charles VI. (*Le Bien Aimé*), (1380–1422), the war was renewed with increased vigor on the part of the English nation, stimulated by the daring valor of Henry V. The signal victory won by the English at Agincourt 1415; the treason and rebellion of the French princes of the blood, who governed the larger provinces; the ambition of the several regents, the ultimate imbecility of the king, the profligacy of his queen, and the love of pleasure early evinced by the dauphin; all combined to aid Henry in his attempts upon the throne. But the premature death of Henry, the persevering spirit of the people, and the extraordinary influence exercised over her countrymen by the Maid of Orleans, concurred in bringing about a thorough reaction, and, after a period of murder, rapine, and anarchy, Charles VII. (*Le Victorieux*), (1422–61), was crowned at Rheims. He obtained from the Estates-Gen-

eral a regular tax (*taille*) for the maintenance of paid soldiers, to keep in check the mercenaries and marauders who pillaged the country. The policy of his successor, Louis XI. (1461–83), the first king entitled 'His most Christian Majesty,' favored the burgher and trading classes at the expense of the nobles, while he humbled the power of the crown princes. He was a crafty ruler, who managed the finances well, and succeeded, by policy and good-luck, in recovering for the crown the territories of Maine, Anjou, and Provence; while he made himself master of some portions of the territories of Charles the Bold, Duke of Burgundy. Charles VIII. (1483–98), by his marriage with Anne of Brittany, secured that powerful state, and consolidated the increasing power of the crown. With him ended the direct male succession of the House of Valois. Louis XII. (1498–1515), (*Le Père du Peuple*) was the only representative of the *Valois-Orleans* family. The tendency of his reign was to confirm the regal supremacy, while the general condition of the people was ameliorated. He and his successor, Francis I. (1515–47), of the *Valois-Angoulême* branch, wasted their resources in futile attempts to establish their hereditary claims to Lombardy, and were thus perpetually embroiled with the House of Austria. A *concordat* with the pope, signed 1516, secured the nomination of the Gallican bishops to the king. In this reign, the Assembly of Notables and Deputies superseded the General-Estates. The defeat of Francis at the battle at Pavia, 1525, and his subsequent imprisonment at Madrid, threw the affairs of the nation into the greatest disorder, and embarrassed the public finances to a ruinous extent. Arts and literature were encouraged in this reign, and in that of the succeeding monarch, Henry II. (1547–59), who continued the disastrous Italian war. In the latter reign began the persecutions of the Protestants, which were carried on with still greater cruelty under Henri's three sons, Francis II. (1559–60), Charles IX. (1560–74), and Henry III. (1574–89), last of this branch of the *Valois*. The massacre of St. Bartholomew (1572) was perpetrated under the direction of the queen-mother, Catharine de' Medici, and the confederation of the League, at the head of which were the Guises. The wars of the League which were carried on by the latter against the Bourbon branches of the princes of the blood-royal, involved the whole nation in their vortex. The succession of Henry IV. of Navarre (1589–1610), a Bourbon prince, descended from a younger son of St. Louis, allayed the fury of these religious wars, but his recantation of Protestantism in favor of Rom. Catholicism, disappointed his own party. The early part of his reign was perpetually disturbed by the mutinies of the troops and the rebellions of the nobles. By degrees, however, Henri through the astute counsels of his minister Sully, and by his own personal popularity, raised the power of the crown higher than ever, while he began a system of thorough administrative reform, which was arrested by his assassination by the fanatic Ravaillac. During the

minority of his son, Louis XIII. (1610–43), Cardinal Richelieu, under the nominal regency of Marie de' Medici, the queen-mother, ruled France with a firm hand, though his oppression of the Protestants at home, and his co-operation with them abroad, in endeavoring to humble the House of Austria, entailed long and costly wars with little fame on France. Cardinal Mazarin, under the regency of the queen-mother, Anne of Austria, exerted nearly equal power for some time during the minority of Louis XIV. (1643–1715). The wars of the Fronde, the misconduct of the parliament, and the humbling of the nobility, gave rise to another civil war, but with the assumption of power by young Louis, a new era commenced, and till near the close of his long reign, the military successes of the French were most brilliant, and the boundaries of France were enlarged very nearly to what they were before the war of 1870–1. The military glory of the kingdom was maintained by a host of gallant commanders, among whom stood conspicuous the names of Turenne, Vauban, Luxembourg, Catinat, Vendôme, Boufflers, and Créqui, while, by the far-sighted policy of the minister Louvois, a well-organized army and newly-created navy made the power of France formidable to all neighboring nations. The progress of the people in the arts of peace was not less marked. At the close of his rule, the oppressive war taxes, the prodigality of the court, the luxurious lives of the clergy, and the absolutism and bigotry of the aged monarch, combined to undermine the foundations of national prosperity and freedom, and at his death the state was left trammelled with a debt of 3,500 millions of livres, and his youthful heir, Louis XV. (1715–75), succeeded to a heritage whose glory was tarnished, and whose stability was shaken to its foundations. The long inglorious reign of Louis XV. presents nothing worthy of notice except the gradual rise of those sentiments of infidelity and license which prepared the overthrow of all the ancient institutions of the country. The regency of the profligate Orleans paved the way for the miseries which followed, while his corrupt financial administration brought the nation into overwhelming monetary embarrassments. In this reign, Corsica was added to France. The thorough disorganization of the state, and the neglect of the fleet and army, prevented all attempts at conquests either on sea or land. The colonies were left a prey to the attacks of other powers, while the capricious change of policy which the king's mistress, Madame Pompadour, forced upon the government, brought contempt upon the country. The peace of Paris, 1763, by which the greater portion of the colonial possessions of France were given up to England, terminated an inglorious war, in which the French had expended 1,350 millions of francs. The close of this unhappy reign was still further disturbed by the cabals of the Jesuits, who were finally banished 1764. In 1774, Louis XVI., a well-meaning, weak prince, succeeded to the throne. His first ministers, Maurepas, Turgot, and Malesherbes, had not

the vigor to carry out the reforms which their sense and patriotism suggested to them, and they were soon compelled to yield to the intrigues of the nobility, and resign their places. They were succeeded by the financier Necker, who endeavored, by economy and method, to arrest the impending bankruptcy of the state; and succeeding ministers made futile attempts to diminish these financial disorders by new forms of taxation, which were generally opposed either by the assembly or by the court. The American war of independence had disseminated republican ideas among the lower orders, while the Assembly of the Notables had discussed and made known to all classes the incapacity of the government, and the wanton prodigality of the court. The nobles and the *tiers état* were alike clamorous for a meeting of the States; the former wishing to impose new taxes on the nation, and the latter determined to inaugurate a thorough and systematic reform. After much opposition on the part of the king and court, the *États Généraux*, which had not met since 1614, assembled at Versailles 1789, May 25.

France was at that moment ripe for a revolution. Although the nobility was exceedingly numerous (as not only did the children of a noble belong to this class, but its numbers were constantly being increased by creation), there were great differences in the rank and dignity attached to the order; thus, in 1789, there were only 44 secular peers, independently of the princes of the blood, and the six originally created ecclesiastic peers; but the lower grades of nobility were so numerous that their numbers stood in the ratio of 1 to 250 of the entire population. Nevertheless, every grade of nobility exempted its holder from the payment of the ordinary land tax, or *taille*, from the charge of maintaining the public roads (*corvée*), from military conscription, from receiving billets of soldiers, etc. The nobles paid the *capitation* tax, but in a very unequal proportion, though the landed property was vested almost entirely in their hands. They, in fact (together with the clergy), monopolized the principal share of the national revenues, and left to the lower classes the burden of labor and of paying the taxes. At the outbreak of the Revolution, the French nobility was sunk in profligacy, and fallen to the lowest stage of demoralization. The clergy kept pace with the nobles in general depravity, and while their aggregate revenues amounted, according to Necker, to 130,000,000 of livres, and their landed property stood in the relation of 1 to $5\frac{3}{4}$ of that of all other proprietors, their contributions toward the maintenance of the state were inadequate and irregular. The open profligacy and excesses of many of the higher members of the hierarchy, moreover, brought the whole priestly order into disrepute. Francis I. had wrung from the church a tithe, known as the *décime paschaline*, and every five years the clergy were expected to present their so-called *dons gratuits ordinaires*, of from 15 to 18 million of livres; while on occasions of need they from time to time made extraordi-

nary *dons gratuits*, which, however, were usually repaid at long intervals. The *tiers état* were crushed by the weight of an unjust taxation, rendered more obnoxious by the system of farming out some of the taxes. The most tyrannical of these was the tax on salt. The municipal institutions which had been permitted to flourish under some of the Valois princes in the middle ages, were almost entirely abolished, and the officers of towns, like those of the state and the courts of justice, were either hereditary or open to purchase. The *tiers état*, which included professional men, and all who were not either members of the noble or the clerical orders, saw themselves utterly excluded from all participation in the privileges and duties of free citizens, at the very time when the extensive circulation of the writings of the philosophers of the 18th c., as Voltaire, Malesherbes, Rousseau, and Montesquieu, had habituated men's minds to the discussion of questions of political independence, equal rights, and universal freedom.

The resistance made by Louis and his advisers to the reasonable demands of the Deputies, 1789, June 17, led to the constitution of the National Assembly—which was followed, June 23, by a declaration of the inviolability of its members. The king retaliated by ordering a large body of troops under arms, dissolved his ministry, and banished Necker, whom he had shortly before recalled under the pressure of public opinion. The consequence was the outbreak of insurrectionary movements at Paris, where blood was shed July 12. On the following day, the national guard was convoked; and on the 14th, the people took possession of the Bastille. The provinces repeated the acts of Paris, and everywhere national guards and revolutionary municipal councils were called together. On Aug. 4, feudal and manorial rights were abrogated by the National Assembly, which gave expression to a solemn declaration of the equality of human rights. The royal princes and all the nobles who could escape sought safety in flight. The royal family having attempted in vain to follow their example, tried to conciliate the people by the feigned assumption of republican sentiments; but on Oct. 5, the rabble, followed by numbers of the national guard, attacked Versailles, and compelled the king and his family to remove to Paris, whither the Assembly also moved. The next two years witnessed the solemn inauguration and the subsequent retraction of various constitutional schemes; the princes of the blood and the ancient noblesse raised corps of emigrés in different parts of the country, but their efforts could not arrest the spread of republicanism. The king alternately made concessions to the republicans, and cherished schemes for escaping from their surveillance, but each month added to his humiliations and to the audacity of those surrounding him. A war with Austria was begun 1792, Apr.; and the defeat of the French was visited on Louis, who was confined in Aug. with his family in the Temple. The advance of the Prussians into Champagne threw Paris into the

1. Napoleon Dispersing the Council of the Five Hundred.
2. Return of Napoleon from Elba in 1815.

wildest excitement. The National Assembly dissolved itself in September. In Dec., the king was brought to trial, and called upon to answer for repeated acts of treason against the republic. On 1793, Jan. 20, sentence of death was passed upon him; and on the following day he was beheaded. Revolts burst out in every part of France. England, Holland, Spain, Naples, and the German states combined together against the republic. Christianity was now formally deposed, and the sacredness of the republic and the worship of Reason were solemnized. Marie Antoinette, the widowed queen, was guillotined; the dauphin and his surviving relatives suffered every indignity that malignity could devise. A reign of blood and terror succeeded. Danton and Robespierre, after having condemned countless numbers to the guillotine, suffered each in turn a similar fate. After the destruction of the Terrorists, a reaction was gradually established; the people were wearied of bloodshed, and anxious for peace and order at any cost. The brilliant exploits of the young general, Napoleon Bonaparte, in Italy, turned men's thoughts to other channels. In 1795, a general amnesty was declared, peace was concluded with Prussia and Spain, and the war was carried on with redoubled vigor against Austria. The Revolution had reached a turning-point. A Directory was formed to administer the government, which was now conducted in a spirit of order and conciliation. In 1797, Bonaparte and his brother-commanders were omnipotent in Italy. Austria was compelled to give up Belgium, accede to peace on any terms, and recognize the Cisalpine Republic. The glory of the French arms was reestablished abroad, but at home the nation were still suffering from the shock of the Revolution. The Directory repudiated two-thirds of the national debt, and thus almost ruined the commerce and credit of France. Under the pretext of attacking England, a fleet of 400 ships and an army of 36,000 picked men were equipped; their destination proved, however, to be Egypt, whither the Directory sent Bonaparte; but the young general, resigning the command to Kleber, landed in France 1799, and at once succeeded in supplanting the Directory, and securing his own nomination as Consul, conjointly with Sièyes and Roger Ducos. In 1800, a new constitution was promulgated, which, though in appearance purely constitutional, in reality vested the sole executive power in Bonaparte, who showed consummate skill in re-organizing the government, to which he imparted a systematic efficiency and a spirit of centralization that secured a thoroughly practical administration. Having resumed his military duties, he marched an army over the Alps, attacked the Austrians unawares, and decided the fate of Italy by his victory at Marengo. In 1801, the peace of Lunéville was concluded, and the boundaries of France were extended to the Rhine. England was the only country which refused to recognize the legality of the various Italian and German conquests of France; and with the exception of a brief period of peace, it

remained the implacable foe of Bonaparte from the days of the Consulate to his defeat at Waterloo. Every period of respite from war was employed by the First Consul in reinstating trade and industry, and in obliterating both in private and public life the stains left by the Reign of Terror. In 1804, on an appeal by universal suffrage to the nation, Bonaparte was proclaimed emperor. The pope came to Paris to crown him and his wife Josephine; a new nobility was rapidly created, and the relatives and favorites of the emperor received vanquished kingdoms and principalities at his hands. For a time, Napoleon's influence with the weakened powers of the continent succeeded in maintaining an injurious system of blockade against England; and, except in the Peninsula, his arms were everywhere victorious. By his marriage with the Archduchess Marie Louisa, daughter of the Emperor of Germany, Napoleon seemed to have given to his throne the prestige of birth, which alone it had lacked. He now availed himself of the freedom afforded by the peace with Austria to expand the material prosperity of the country, by encouraging trade, constructing roads, bridges, and canals in every part of the empire, and by consolidating his government, and organizing a complete code of laws and a systematic mode of administering them. But this period was the poorest in respect to the literary and scientific development of the nation, who were too much trammelled by police supervision and military discipline to exercise freedom of thought and intellect, and this interval of comparative repose was soon interrupted by the ambitious designs of Napoleon on Germany, which led to a declaration of war against Russia 1812. From this time to his final defeat 1815, the emperor rapidly receded from the lofty station that he had won. The disastrous Russian campaign in which his noble army was lost amid the rigors of a northern winter, was soon followed by the falling away of his allies and feudatories. Napoleon himself was still victorious wherever he appeared in person, but his generals were beaten in numerous engagements; and the great defeat of Leipsic compelled the French to retreat beyond the Rhine. The Swedes brought reinforcements to swell the ranks of his enemies on the e. frontier, while the English pressed on from the w.; the senate and his ministry betrayed his cause, and the allies threw themselves on Paris, which, in the absence of the emperor, capitulated after a short resistance, 1814, Mar. 30. Napoleon now abdicated in favor of his young son, and retired to the island of Elba, the sovereignty of which had been granted to him. His wife and son removed to Vienna; his family were declared to have forfeited the throne; France was reduced to her former limits, and the provinces that she had acquired were restored to their national rulers. On May 3, Louis XVIII. (brother of Louis XVI.) made his entry into Paris. The conduct of the Bourbons did not conciliate the nation; they returned loaded with debts, and surrounded by the old nobility and clergy, who had not renounced their former

privileges, and who had looked upon the generation of Frenchmen who had arisen during their absence as their natural enemies. A narrow spirit influenced the weak policy of the king, which led to the establishment of a strict censorship, the extension of the powers of the police, and the persecution of all the adherents of the Empire; while the lower classes and the army, who alike were sensible of the humiliating reaction which had followed the former excitement of war and conquest, were treated with an indifference, and even contempt, by the returned emigrés to which they were wholly unaccustomed. 1815, Mar. 1, Napoleon left Elba, and landed in France. Crowds followed him; the soldiers flocked around his standard; the Bourbons fled, and he took possession of their lately deserted palaces. The news of his landing spread terror through Europe; and on Mar. 25, a treaty of alliance was signed at Vienna between Austria, Russia, Prussia, and England, and preparations at once made to put down the movement in his favor, and restore the Bourbon dynasty. At first, the old prestige of success seemed to attend Napoleon; but on June 18, he was thoroughly defeated at Waterloo; and having placed himself under the safeguard of the English, he was sent to the island of St. Helena, in conformity with the generally acknowledged sentiment, that it was necessary to the peace of Europe to remove him finally and definitely from the scene of his former power. The second restoration gave occasion to many pledges of a more liberal policy on the part of Louis, but few of them were fulfilled, and a general and sullen discontent reigned among the people, who were again deprived of all voice in the administration, or in the election to offices, and were harassed by the petty tyranny of the priests, who were the favorite advisers of the crown. In 1821, Napoleon breathed his last at St. Helena; and in 1824, Louis XVIII. died without direct heirs, and his brother, the Duc D'Artois, succeeded as Charles X. The same ministerial incapacity, want of good faith, general discontent, and excessive priestly influence characterized this reign, which was abruptly brought to a close by the revolution of 1830, and the election to the throne of Louis Philippe, Duke of Orleans, as king, by the will of the people. Legitimist insurrections disturbed the nation; one *émeute* succeeded another; attempts upon the king's life were frequent; but the progress in material prosperity made the government popular with the *bourgeoisie*, or middle classes, and for a time it held its ground. The warlike propensities of the nation found an outlet in the war in Algeria (q.v.) with Abd-el-Kader. But the determined resistance of the king to the growing desire for electoral reform, led at last to open insurrection in Paris; and Louis Philippe having abdicated, 1848, Feb. 24, a Republic was proclaimed, under a provisional government. An insurrection of the Red Republicans in Paris (1848, June) was put down only after great slaughter. Louis Napoleon (q.v.) was elected President of the Republic

1848, Dec.; but by the famous *coup d'état* of 1851, Dec. 2, he violently set aside the constitution, and assumed dictatorial powers; and a year after (1852, Dec. 2), was raised, by the almost unanimous voice of the nation, to the dignity of Emperor as Napoleon III. His rule was one of complete absolutism, under which, however, France made great advances in the development of her natural resources, and in manufactures. Assuming the character of an adjuster of the wrongs of nations, Napoleon proclaimed himself a mediator in the Danish and Austro-Prussian wars, and the defender of the Italians against Austria, of the Pope against the people of Italy, and of the Mexicans against the government of the United States of America. By his help the Italians were relieved from the Austrian yoke, and the pope was left master of Rome; but in Mexico his intervention only led to greater bloodshed, and ended ignominiously for the glory of France, and fatally for the cause and life of his protégé, the Austrian Prince Maximilian (q.v.). Attempts to gain a Prussian alliance ended in humiliating repulses. Although the brilliant success of the Paris Exhibition of 1867 seemed to afford evidence of the personal and national consideration in which the emperor was held, his political credit had already then lost its importance. At home, the great financial embarrassments of his government were arousing the discontent of the people; and to avert the growing disaffection, Napoleon offered (1869) to adopt a constitutional form of government, and to make some concessions in regard to freedom of the press. It was soon found that the responsibility of the ministry was fictitious, and that the emperor availed himself of its protection to cloak his own acts of personal government. The result of the appeal made to the nation 1870, on the plea of securing their sanction for his policy, was not what he had anticipated; and the 50,000 dissentient votes given by the troops in this plébiscite, revealed a hitherto unsuspected source of danger. Confident in the efficiency of the army, and anxious to rekindle its ardor, he availed himself of a pretext to declare war against Prussia. The course of events in the short but terrible Franco-German conflict of 1870–1 electrified Europe by its unexpected character, revealing at once the solidity of Prussian strength, and the hollowness of imperial power in France. Within a fortnight of the emperor's appearance at the head of his troops at Metz, 1870, July 28, the strength of the French army was annihilated, Alsace and Lorraine were occupied by Germans, and the Chamber of Deputies in Paris was clamoring for his abdication. On Sep. 2, Napoleon, with his army of 90,000 men, surrendered at Sedan, and on the 4th, Paris was in rebellion, the senate dissolved, the Empress Regent a fugitive on her way to England, and France proclaimed a Republic amid tumultuous excitement. Before the close of Sep., Strasburg, one of the last hopes of France, had capitulated, and Paris was completely invested by German troops; and on Oct. 5, the Prussian

king had taken up his headquarters at Versailles. The fall of Metz, with 180,000 men, completed the disasters of the year. In 1871, Jan., the united efforts of the different branches of 'the Provisional Government of Defense,' respectively installed at Paris and Tours, succeeded in bringing about an armistice, after the besieged Parisians had for four months been hourly exposed to the fire of the enemy, cut off from all communication with the outer world except by balloons and carrier-pigeons, and finally threatened by famine. With the concurrence of Prussia, the French nation now proceeded, by a general election of representatives, to provide for the exigencies of the country. The first National Assembly of the French Republic met at Bordeaux in February. After receiving from the Provisional Govt. of Defense the resignation of the powers confided to them in 1870, Sep., the Assembly undertook to organize the Republican Govt., and nominated M. Thiers chief of the executive power of the state, with the title of President of the French Republic, but with the condition of responsibility to the National Assembly. On Mar. 1 the preliminaries of peace were finally ratified at Bordeaux, the chief conditions being that the province of Alsace (except Belfort) and part of Lorraine, including Metz, should be ceded to the German empire, and that France should pay a war indemnity of 5,000 millions of francs, and continue to be occupied by German troops till the money was all paid. This enormous obligation was discharged 1873, Sep., and during the same month, France, after an occupation of three years, was finally relieved from the presence of foreign troops. For further account of this war, see FRANCO-GERMAN WAR. In the spring of 1871, the peace of France was seriously threatened by a successful outbreak at Paris on the part of the Communists (q.v.), who after great bloodshed and grievous damage to public and private property, were quelled by the regular army, which had sided with the government, and on May 20 order was restored in Paris. Since then, France has been successfully trying to obliterate some of the numerous misfortunes resulting from the war, and commerce and national prosperity have very rapidly revived. The ex-Emperor Napoleon died 1872, at Chislehurst, England, where he had resided with his family since his liberation 1871, March. In 1873 M. Thiers resigned the office of Pres. of the French Republic, and was succeeded by Marshal MacMahon, who soon had his presidential powers confirmed to him for a period of seven years, generally known as the Septennate. The ministry of the Duc de Broglie was composed mainly of Legitimists, Orleanists, and Bonapartists, and in its time ultramontanism and Bonapartism made progress. The fusion of the Orleanists and Legitimists, though earnestly attempted, was completely foiled by the obstinacy of the Duc de Chambord. Several ministries succeeded that of De Broglie, and there were fears of a *coup d'état* on the part of the president. But the elections of 1877 returned

a large republican majority to the Chamber of Deputies; and MacMahon, yielding to the national will, summoned M. Dufaure, who chose a thoroughly republican ministry. In 1879, the Senate also became predominantly republican. Reactionary prefects were removed; and, on the whole, the republican form of government was greatly consolidated during MacMahon's tenure of office, and continued to secure more and more the confidence of the French people. The national vigor and prosperity were manifested in a successful International Exhibition at Paris 1878. Early in 1879, MacMahon, disapproving of certain military changes resigned office, and M. Grévy (q.v.) became president. There have been many changes of ministry, M. Gambetta (q.v.) having formed a ministry 1881, Nov., only to resign 1882, Jan., the year of his death; but the current of policy has been steadily republican. An amnesty was granted to the Communist prisoners. At the instance of M. Ferry, who became premier 1883, a decree was issued by which Jesuit schools were closed; all unrecognized religious orders declining to submit to the conditions necessary for state sanction, were dissolved; and some 7,400 inhabitants were thus expelled from 384 monasteries. Much controversy turned on the political proposal, supported by M. Gambetta, to make the department the electoral unit of area (introducing *scrutin de liste*), instead of the arrondissement (with *scrutin d'arrondissement*) as heretofore. In 1884, the constitution was revised, and the senate was made entirely elective: the princes were declared ineligible to any office. France sent an expedition to Tunis 1881, and compelled the Bey to sign a treaty by which Tunis became virtually a French protectorate (see TUNIS). In 1883, France claimed certain rights over the n.w. part of Madagascar, and enforced the claim by bombarding and occupying several ports. And in spite of the opposition of Annam and China, she insisted on having the protectorate of Tonquin (q.v.). This led to a military expedition thither, which met with stubborn and prolonged resistance. Popular dissatisfaction with the war policy led to a change of cabinet; and 1885, Apr., Henri Brisson became premier. The succeeding elections reduced the Republican majority in the chamber; and a new cabinet was formed 1886, under de Freycinet. A decree was passed banishing or disfranchising the Orleans princes. The Freycinet ministry was defeated 1886, Dec., and followed by one organized by René Goblet, who appointed Gen. Boulanger minister of war. The latter achieved notoriety by his energy, activity, and bill for the reorganization of the army, but lost office on the fall of the Goblet ministry 1887, May, and was removed from his command by the Rouvier Cabinet. Boulanger (q.v.) was elected to the assembly from several depts. and commenced an agitation which for a time threatened to overthrow the Republic. In 1887 President Grévy's resignation was caused by the exposure of his son-in-law's questionable practices in the sale of decorations, and Sadi

Carnot (q.v.) was elected president. In Mar. 1892 a commerical reciprocity treaty was signed with the U. S. In 1893, charges of bribery and corruption over the Panama Canal scheme were made against prominent officials who were condemned to fines and imprisonment. President Carnot was assassinated 1894, June 25, and was succeeded by Casimir Périer, who resigned 1895, Jan. 15. Félix Faure was elected Jan. 17. After military expeditions, Dahomey in 1893, and Madagascar in 1895, became French protectorates, and large acquisitions of territory were made in north and western Africa. An attempt to occupy Fashoda during the Anglo-Egyptian campaign in southern Sudan during 1898, almost led to war with Gt. Britain, a convention of 1899 delimiting the boundaries. The Dual Alliance (q.v.) with Russia during these years had strengthened French prestige. In 1897 began the Dreyfus case (q.v.), which agitated the country until 1906. President Faure died in 1899 and was succeeded by Emile Loubet. Under the Waldeck-Rousseau and the Combes cabinets, the govt. measures from 1900 to 1906, resulted in the separation of church and state, and the regulation of clerical education, already described under *Religion and Churches*. Arbitration treaties were concluded in 1904 with several countries, including the United States, and the important Anglo-French Alliance consummated April 8. German opposition to the Anglo-French agreement as to Morocco led to complications and the Algeciras Conference 1905–06. Armand Fallières succeeded E. Loubet as President 1906, Jan. 17.

Bibliography.—Adams, *Democracy and Monarchy in France* (1884); Bodley, *France* (1898); Block, *French Dictionary* (1878); Bourgeois, *France Under Louis XIV* (1889); Cleveland, *Constitution of France* (1890); Coubertin, *The Evolution of France Under the Third Republic* (1897); Currier *Laws of France* (1875); Duruy, *Histoire de France* (1889); Elliot, *Old Court Life in France* (1892); Erckmann-Chatrian, *Invasion of France*, 1814 (1885); Fleury, *Histoire de France* (1891); Guerber, *Empresses of France* (1892); Guizot, *Histoire de France* (1870); Hassell, *The French People* (1892); Kitchin, *History of France to* 1793 (1882); Lacroix, *Mineralogy of France and Her Colonies* (1894); Martin, *Histoire de France* (1860); Sorel, *Lectures Historique* (1894); Sybel, *History of the French Revolution* (1869); Thiers, *History of the French Revolution* (1881); Von Holst, *The French Revolution* (1894); White, *History of France* (1890). See also works on Napoleon, Franco-Prussian War, Joan d'Arc, etc.

FRANCE, Isle of. See Mauritius.

FRANCESCO DI PAULA, *frân-chĕs'ko dē pow'lâ*, Saint: founder of the order of the *Minims:* 1416–1507; b. Paula or Paolo, a village of Calabria. At the age of 14 he was already famous for austerity of life. He was summoned to the deathbed of Louis XI. of France, to work a cure.

FRANCHE COMTÉ, *frŏngsh kōng-tā′:* old province in the e. of France, in the basin of the Rhone. It comprised what now forms the dept. of Doubs, Haute-Saône, and Jura, and had for its capital Besançon.

FRANCHISE, n. *frăn′chīz* or *-chĭz* [F. *franchise*—from *franc*, open, free—from mid. L. *francus*, free: Icel. *frackr*, freeborn, a Frank: Bret. *frank*, spacious, wide: OE. *franklin*, a freeman]: privilege; right granted; in *OE.*, extent of jurisdiction. In English Law: a royal privilege subsisting in the hands of the subject. Being derived from the crown, franchises must arise from royal grant, or in some cases may be held by prescription, which presupposes a grant. The subjects of franchise being the peculiar property of the crown, correspond with what in Scotland are called regalia. Gifts of waifs, estrays, wrecks, treasure-trove, royal fish, and forfeitures, are franchises; so are the rights of forest, chase, park, warren, and fishery. A county palatine (see PALATINE) is the highest species of franchise. So the crown may create a liberty or bailiwick independent of the sheriff of the county. It is likewise a franchise for a number of persons to be incorporated, with a power to do corporate acts; also each member of such corporation is said to have a franchise. The right to hold a fair or market, or to establish a ferry, and to levy tolls therein, also is a franchise. Franchises may be extinguished by reunion with the crown or lost by *misuser* or by *non-user*. FRANCHISE, v. to enfranchise, which see. FRAN′CHISEMENT, n. in *OE.*, freedom; release. POLITICAL FRANCHISE, the right or privilege of voting; the right of the individual to exercise a certain limited portion of the general sovereignity of the state. A franchise in this sense is possible only in a free state—in a state in which the governed, as a whole, are identical with the governors. Where legislation is effected by the votes of the people themselves, as it was in the small states of antiquity, the franchise is exercised by each individual directly. Where representation has been introduced, the franchise is the right which the citizen has of voting for his representative. The extent or value which ought to belong to the franchise will be measured by the amount of the sovereignty which it expresses. But this sovereignty finds forms of actual expression, in the amount of power and influence which is conceded to the individual by the society of which he is a part; whence it may be claimed that the proper *practical* franchise would be one corresponding accurately to the social position of each individual. A *theoretically* just franchise would be one corresponding accurately to the rightful claim of each individual to power and influence —a claim based in every instance on moral character and practical wisdom and force. But an approximation is all that is possible in dealing with the mass; and one of the questions at present most keenly discussed among speculative politicians is, by what test shall this approximate estimate of social value be brought most nearly to the truth. Mill proposed intelligence, as indicated by instruc-

tion, as the sole measure of individual sovereignty, and, consequently, as the basis of the franchise. Others have proposed wealth; while a third class of speculators contend that, in the case of each individual, there are various elements of social importance which must be taken in account in determining the political value which is his due. By most recent writers on the theory of government, however, the idea of all citizens being entitled to an equal suffrage, however great the disparity of age, intelligence, education, moral worth, manhood, influence, wealth, and other elements which go to make up social importance, is repudiated as a scientific absurdity. It is questionable indeed whether the franchise can be claimed on the ground of a merely personal right by any one: it seems rather to combine the two elements of individual right, and of a grant by the state which ratifies that right and marks out the limits of its exercise. In such a grant by the community, the public welfare must be the decisive element; and it remains for the general wisdom to decide whether the public welfare will, on the whole, be best subserved by conferring the franchise on all citizens alike, or by conferring it on certain classes only; and whether such classes shall be formed according to age, or sex, or intelligence, or moral worth, or education, or property, or according to any two or more of these. See Mill's work on Representative Government: also BALLOT: DEMOCRACY: GOVERNMENT: PARLIAMENT: REPRESENTATION: REPUBLIC: SUFFRAGE.

FRANCIA, *frân'châ*, FRANCESCO (FRANCESCO RAIBOLINI): 1456—1517, Jan. 5; b. Bologna: painter. He was son of a carpenter, learned the goldsmith's trade with a noted master whose name he took, became eminent as goldsmith and engraver of dies, and held the offices of steward of goldsmiths and master of the Bologna mint. It is not known when he began studying or practicing painting, but his earliest known work, a Madonna surrounded by six saints, is dated 1494. It was painted in oil for the church of St. Maria della Misericordia on the order of the Bentivoglio family, who also employed him to fresco their palace. His works resembled those of Perugino at first and then of Raphael, with whom he became intimate.

FRANCIA, *frân'se-â* or *frân'the-â*, Dr. JOSÉ GASPAR RODRIGUEZ, Dictator of Paraguay: 1756—1840 (ruled 1814–40); b. near the town of Asuncion; son of a small landed proprietor, of French or Portuguese origin. He was intended for the priesthood, studied at the University of Cordova de Tucuman, where he took his degree as doctor of divinity or of canon law, and was for some time a theological professor. Subsequently he adopted the profession of law, and practiced 30 years, gaining much reputation for learning, skill, honesty, and independence. When he had attained the age of 52 or 53, the revolution which shattered the Spanish yoke in S. America broke out in Buenos Ayres. Paraguay at first offered active opposition to the revolutionists, but ultimately sought to obtain

independence. Francia was a leader in the movement, and was made sec. of the independent junta, but soon resigned. The conviction, however, being strong in the public mind that only Francia could properly direct the new republic, he was, 1813, appointed joint-consul with Gen. Yegros. The latter seems to have lacked intellect or energy, and Francia was really sole ruler from the first. In 1814, he was appointed dictator for three years, at the expiry of which time the dictatorship was given him for life; and he exercised absolute control (in all for 26 years) until his death. Under Francia, the condition of Paraguay rapidly improved, and the system of non-intercourse, political or commercial, with other nations, which he enforced, however much it may seem to indicate lack of administrative sagacity, was undoubtedly beneficial. So strict were the regulations against foreign intercourse, that ingress to, or egress from, Paraguay was next to impossible; and Francia's treatment of some foreigners who did enter (among others the famous savant Bonpland), and of others who were prevented entering, savored of harshness, and even barbarism. Yet his administrative talent was of a high order. He improved agriculture, making two crops of corn grow where only one had grown before. He introduced schools, promoted education, repressed superstition, and enforced strict justice between man and man in his law-courts. His death was regretted by the people as a public calamity—the best proof that he was no vulgar tyrant. See Rengger and Longchamp's *Essai Historique*, etc. (Paris 1827); *Francia's Reign of Terror* (London 1839), by J. P. and W. P. Robertson, two young Scotchmen whom Francia turned out of the country; and T. Carlyle essay in the *Edinburgh Review* (1843).

FRANCIABIGIO, *frân-châ-bē'jo*, or Francia Bigio (Francesco di Cristofano): 1482–1525; b. Florence: painter. He studied with Mariotto Albertinelli, and became associated with Andrea del Sarto 1505. In 1513, he painted the *Marriage of the Virgin* in the court of the Servi in Florence, as part of a series of frescoes designed by his associate; and, enraged at some monks who uncovered it before completion, nearly destroyed it with a hammer. As neither he nor any other painter would repair the fresco, it remains as he injured it. In 1518–19 he painted the *Departure of John the Baptist for the Desert* in a series of Andrea's frescoes at Lo Scalzo, and 1521 the *Triumph of Cicero* at the Medici Palace, Poggio a Caiano. He painted a large number of portraits which are in various collections in Europe.

FRANCIS, *frăn'sĭs*, I., King of France: 1494, Sep. 12 —1547, Mar. 31 (reigned 1515–1547); b. Cognac; son of Charles, Comte d'Angoulême. In youth he took delight in the romances of chivalry, whence probably, he drew his brilliant but erroneous views of a kingly character. At the age of 20, he married Claude, daughter of Louis XII., and succeeded his father-in-law, 1515, Jan. 1. His first act was to undertake the reconquest of Milan,

which had been wrested from his predecessor two years before; and at the head of 40,000 men, among whom were such great warriors as the Constable Bourbon, Bayard, Lautrec, and Trivulzio, Francis crossed the Alps, and attacked the Swiss allies of the Milanese at Marignano, ten m. from Milan. Here a sanguinary battle, afterward called the 'battle of the giants,' ensued (1515, Sep. 13), in which Francis obtained a complete victory—the Swiss losing 12,000 men. In accordance with his chivalrous propensities, Francis accepted knighthood on the field from the renowned Bayard. After some further successes, Francis returned to Paris 1516, Feb. On the death of Maximilian, emperor of Germany, 1519, Jan., Francis and Charles of Spain became rival candidates for the imperial crown. The election of the latter excited the anger of Francis, who immediately prepared for war, and endeavored to secure the alliance of Henry VIII. of England. An interview took place 1520 between the two monarchs on the famous *field of the cloth of gold* between Guines and Ardres, but it led to no result, and shortly afterward Henry formed an alliance with the pope and the emperor against Francis. The papal troops drove the French out of Italy; and the soldiers of Henry and the emperor invaded France on the north, while, to complete his perplexities the constable Bourbon, who was discovered to be conspiring against his sovereign, fled to Charles, who gladly accepted the sword of the renegade warrior. Francis gallantly faced the dangers that now threatened his kingdom. A large army was sent to Italy under the command of Bonnivet, who proved incapable, and was forced to retreat across the Alps. In the course of this retreat, Bayard lost his life. The imperialists now advanced into Provence, but on the approach of the French king, withdrew into Italy, whither they were followed by Francis, who overran Lombardy, but was totally defeated and taken prisoner at the battle of Pavia, 1525, Feb. 24. Charles carried his captive to Madrid, and granted him his liberty only on the hardest conditions. Francis had to renounce the suzerainty of Flanders and Artois, the duchy of Burgundy, and all his Italian possessions and prerogatives, to promise the restoration of Bourbon to his former dignities, and to surrender his two sons as hostages. He obtained his freedom 1526, March 17; but regarding the conduct of Charles as utterly base, his first act, on his return to his dominions, was a refusal to fulfil the pledges that he had given. Pope Clement VII. absolved him from his oath; England, Rome, Venice, Florence, and Genoa—all of whom were growing alarmed at the immense power of Charles—withdrew from the imperial alliance, and sided with Francis. The war in Italy recommenced; and 1527, May 5, Bourbon's 'black banditti' stormed and sacked the 'Eternal City,' and captured the pope. Francis now sent troops into Naples, which, after a series of brilliant successes, were almost wholly cut off by disease, mainly through the negligence of the king, who failed to supply them with the means of subsistence. About the same

time, Francis sent a challenge to Charles to decide their quarrel by single combat. The challenge was accepted, but the duel never was fought. At last, a peace was concluded at Cambray, 1529, July, much to the advantage of the Spaniards. In 1534, however, war broke out between Francis and the Duke of Milan; and in the following year the former overran Savoy, to which he laid claim by the absurdest pretensions. The conduct of Charles at this period was marked by the greatest moderation, but he was ultimately reinvolved in hostilities with his inveterate opponent. Little definite result ensued, but the war was marked by a circumstance regarded as horrible in those days—viz., an alliance between Christians and Turks. Francis formally entered into a league with the Sultan Soliman, who went so far as to land troops in the south of Italy, but the French king shrunk from a practical cooperation with the arch-enemy of Christendom. By the efforts of Pope Paul III., a treaty was concluded at Nice between Charles and Francis, 1538, June 18. In fact, however, peace lasted only four years, and in 1542, Francis, insatiable of glory, launched five different armies against the emperor. The battle of Cerisolles, 1544, April 14, in which the French were completely victorious, partially wiped out the dishonor of the defeat at Pavia, but a second alliance of Francis with the Turks renewed the indignation of Christendom. Charles, and Henry, King of England, marched upon Paris, and Francis was compelled to make peace at Crepy, 1544, Sept. 18. His political rôle was now finished. He died at Rambouillet. It is not difficult to estimate the character of this monarch. Gay and voluptuous (it was the physical consequences of an amour which cost him his life), he was still capable of heroic impulses and acts of splendid generosity. But no amount of 'chivalry' could compensate for his lack of political sagacity; it could not even save him from deeds of cruelty. His persecution of the Vaudois and other 'heretics' has left a dark stain on his memory, which all his patronage of arts and letters will not efface.

FRAN'CIS II., King of France: 1544, Jan.—1560, Dec. 5 (reigned 1559–60); eldest son of Henry II. and Catharine de Medici. He married Mary Stuart, Queen of Scots, 1558, and succeeded to the throne of his father, 1559, July 10. He placed the direction of state affairs in the hands of the Duc de Guise and Card. Lorraine, uncles of his queen, and Rom. Catholics, and this act led the king of Navarre, Prince of Condé and other nobles to unite with the Protestants, then under persecution, against the Guises. The conspiracy was discovered 1560, and the Prince of Condé was condemned to death, but escaped by the death of the king. Francis was succeeded by his brother, Charles IX.

FRAN'CIS I. (Stephen), Emperor of Germany: 1708—1765, Aug. (reigned 1745–65): eldest son of Leopold, Duke of Lorraine. On the death of his father 1729, Francis succeeded him to the dukedom, which, 1739, he ceded to Stanislaus Leszcynski, father-in-law of Louis XV., to revert after

his death to the crown of France. In lieu of Lorraine, he obtained the grand duchy of Tuscany, whose native rulers, the Medicean family, were about to die out. In 1736, he married Maria Theresa of Austria, only daughter and heiress of Emperor Charles VI. In 1740, Charles died, and Maria Theresa succeeded him; she made her husband coregent with herself, but gave him little share in the administration. Francis fought bravely for his wife's rights in the wars against Frederick the Great. In 1745, he was elected to the once important dignity of Emperor of Germany, and crowned at Frankfurt. The famous Seven Years' War (1756–63) then broke out between Austria and Prussia; but the cares which it imposed fell mainly upon his leonine consort Maria Theresa. Francis died at Innsprück, and his son Joseph succeeded him in the imperial dignity, but Maria Theresa retained in her hands the sovereignty of the Austrian dominions till her death.

FRAN'CIS II., Emperor of Germany (Francis I. of Austria): 1768, Feb.—1835, Mar. 2 (reigned German Emp. 1792–1806; Austrian Emp. 1804–35); b. Florence; eldest son of Leopold II., Grand Duke of Tuscany, and of Maria Louisa, daughter of Charles III., king of Spain. In 1790, his father became Emperor of Austria by the death of his brother Joseph, but died only two years afterward when the crown devolved upon Francis. The French Revolution was now exciting the alarm of the old European dynasties; Francis concluded an alliance with Prussia against the new republic: and the armies of the allies marched to the frontiers of France, but soon recoiled before the fiery enthusiasm of the republican troops. In 1794, Francis placed himself at the head of the army of the Netherlands, which, April 26, defeated the French at Cateau and Landrecy; and May 22, gained the bloody battle of Tournay; but on the whole the fortune of the war was against him; and the triumphs of young Gen. Bonaparte in Italy forced Francis to conclude the treaty of Campo Formio, 1807, Oct. 17. Only two years afterward, however, Francis, in alliance with Russia and England, again took up arms, and was at first successful; but the recall of the brave Russian general, Suwaroff, and the return of Bonaparte from the East, quickly altered the state of matters. The great victories won by Moreau at Hohenlinden, and by Bonaparte at Marengo, paralyzed the powers of Austria, and Francis was compelled to sue for peace, which was obtained by the treaty of Lunéville, 1801, by which the whole of the left bank of the Rhine was ceded to France. In 1805, the aggressions of France once more excited the jealousy of Austria. Francis entered into a new alliance with Russia; and the contest was renewed, but ended more disastrously than ever for the Austrians. The French victories of Ulm and Austerlitz, and the capture of Vienna, completely humiliated Francis, who at the peace of Presburg (1805, Dec.) was obliged to surrender the Venetian states and the Tyrol. The German empire was now dissolved, after lasting for 1,000 years; Francis assumed (1804) the

inapt title of Emperor of Austria, King of Bohemia and Hungary. In 1809, he recommenced the war with Napoleon, and obtained more success, or encountered less loss than on previous occasions. The tremendous battle of Aspern *was* a victory, though not decisive, and did much to restore the prestige of the Austrian arms. Still Napoleon again got possession of Vienna, and dictated terms of peace from the palace of Schönnbrunn in Oct. of the same year. In 1810, the French Emperor married Francis's daughter, Maria Louisa. A permanent friendly alliance now seemed concluded between the two empires; and during the Russian campaign 1812, the Austrians rendered the French some slight assistance. In 1813, Austria resumed its neutrality; but Francis, after having exerted himself fruitlessly to mediate between France and Russia, suddenly joined the allies, helped to win the battle of Leipsic, and followed the Russians and Prussians to Paris 1814. His subsequent career presents no points of importance. He labored honestly and indefatigably for the welfare of his subjects, encouraging the making of roads and canals, and the introduction of manufactures; but his horror of everything revolutionary, excited by his early recollections, and by the cruel death of his aunt Marie Antoinette, and kept alive by his long wars with France, had rendered him an absolutist in politics, and a lover of that system of centralization to which Austria clings.

FRANCIS I., King of the Two Sicilies: 1777, Aug. 19—1830, Nov. 8 (reigned 1825–30); son of Ferdinand I. of Naples and of Caroline Maria of Austria. He became heir to the throne on the death of his elder brother 1778, married Maria Clementina, daughter of Emperor Leopold II. 1797, and a daughter of Charles IV. of Spain 1801; was appointed regent of Naples 1812, proclaimed a constitutional form of govt., and was deposed by his father 1813, returned to Naples 1815, was appointed by his father gov. of Sicily, and was reinstated as regent of Naples 1820. He succeeded his father 1825, Jan. 4, and after a reign noted for mismanagement, corruption and the massacre at Bosco, was succeeded by his son, Ferdinand II.

FRANCIS II., King of the Two Sicilies: b. 1836, Jan. 16 (reigned 1859–60); d. 1894, Dec. 27; son of Ferdinand II. (*Bomba*) and of Princess Christina of Savoy. He married Princess Caroline, daughter of Maximilian Joseph of Bavaria and sister of the empress of Austria, 1859, and soon afterward (May 22) succeeded to his father's throne. Declining Victor Emmanuel's invitation to join him against Austria, he continued the reactionary policy of his father, and so stirred up his subjects that they revolted 1860. Garibaldi (q.v.) headed an expedition which, landing in Sicily, defeated the Neapolitan army in every encounter. Francis sought foreign intervention in vain, did nothing to conciliate his subjects, and fled from Naples with his family to the Gaeta fortress on the eve of Garibaldi's entrance into the city. After a siege of six months he surrendered with the garrison to the Sardinia troops 1861, Feb. 14.

FRANCIS, David Rowland, American politician: b. Richmond, Ky., 1850, Oct. 1. He was graduated from Washington University, St. Louis, 1870, entered business and in 1877 established the firm of Francis Brothers, grain merchants, St. Louis. He was mayor of St. Louis 1885–9, governor of Missouri 1889–93, secretary of the interior under President Cleveland 1896–7, and became president of the Louisiana Purchase Centennial Exposition in 1901.

FRANCIS de Sales, *sâl* or *sâ'lĭs*, sometimes *sālz*, Saint: 1567, Aug. 21—1622, Dec. 28; b. near Annecy, Savoy: Rom. Cath. bp. He was of noble birth, was educated in the College of Annecy, the Jesuit school in Paris, and the law school in Padua, and received the degree ll.d. at the latter when 20 years old. His family and friends desired that he should seek a political career, and the office of senator was offered him several times without acceptance. His preference was for an ecclesiastical life, and on obtaining his father's permission he became provost and then deacon of the Cathedral of Geneva. Here he attracted attention by his eloquence and power as a preacher, and his advancement was rapid. He was raised to the priesthood 1593, and then entered upon a remarkable series of missionary labors. He first visited the prisons and abodes of poverty in the neighboring villages, then with a cousin went to the province of Chablais and began work among the Protestants. Through his efforts many Prot. ministers were expelled, and the Rom. Cath. communion was restored 1598. The pope commissioned him to convert the influential Theodore Beza, but though he offered him the rank of cardinal he was wholly unsuccessful. In 1599 he was appointed coadjutor to the bp. of Geneva, and became his successor 1602. Soon afterward he went to Paris, preached before Henry IV., and was urged with grand offers of wealth and rank to remain in France, but he rejected all the royal overtures, and after taking part in establishing the Carmelite order and the Congregation of the Oratory, returned to Switzerland, and applied himself with renewed zeal to missionary labor and the spiritual improvement of the church. A strong believer in the value of monastic institutions, he established many convents of existing orders, and with the aid of the widow of Baron de Chantal, whom he met in Paris 1604, founded the new Order of the Visitation for the relief of the sick and the poor 1610, with the mother-house at Annecy. His high reputation as preacher, arbitrator, and missionary, and his eminent success in the work of conversion, were augmented 1608 by the publication of his *L'Introduction a la vie dévote*, which was widely translated and had an enormous sale. He followed this, 1616, with *Traité de l'amour de Dieu*, and was soon afterward relieved of much of the burden of his work through the appointment of a younger brother as his coadjutor. In 1619 he was appointed a member of the embassy sent to France to seek the hand of Princess Christina for the prince of Piedmont, and while in Paris preached to great audiences. In 1622 he was invited to accompany

Louis XIII. of France on his journey from Avignon to Lyons, and shortly after preaching in the latter city on Christmas day was fatally stricken with apoplexy. He was canonized 1665.

FRANCIS, John Wakefield, m.d., ll.d.: 1789, Nov. 17—1861, Feb. 8; b. New York: physician. He graduated at Columbia College 1809 and at the College of Physicians and Surgeons 1811, established a partnership with his preceptor, David Hosack, m.d., and was associated with him in the publication of the *American Medical and Philosophical Register* 1810–14. In 1813 he was appointed prof. of materia medica in Columbia College, 1816 went to Europe and studied with Dr. Abernethy, and on his return to New York resumed labor in the college as prof. of the institutes of medicine, of medical jurisprudence, and of obstetrics, successively till 1826. At the organization of the Rutger's Med. School 1826 he became prof. of obstetrics there and served four years. He was elected president of the New York Acad. of Medicine at its organization 1847, and was connected with numerous societies in this country and abroad.

FRANCIS, Joseph, American inventor: b. Boston, Mass. 1801, March 12; d. Cooperstown, N. Y., 1893, May 10. He was the inventor of a number of life-boats and life-cars which came into general use and by means of which 200 persons were saved when the British ship Ayrshire was wrecked on the New Jersey coast in 1850. It is estimated that in four years as many as 2,150 lives were saved.

FRANCIS of Assisi, Saint: founder of the Franciscan order: b. Assisi 1182; d. 1226, Oct. 4. His father was a merchant. At the age of 14 Francis was taken from the school of the parish priest to be placed in his father's business. He soon became a leader of a gay band of youths devoted to the science and the poetry of the troubadours. He was distinguished among his companions for his splendid dress and lavish expenditure. After recovering from a serious illness, Francis lost all interest in the pleasures of former years, and while on a pilgrimage to Rome, he determined to embrace a life of poverty. A rupture with his father followed. In solitude he was more and more drawn to the idea of reproducing the life of Christ while on earth. He began to preach, and one by one he gathered around him those whom his own ardor had inflamed. In 1208, seven companions met him at Rivo Torto to adopt a rule for life in community. The precepts of this rule were based upon three verses of Scripture that had met the eyes of St. Francis, when, for guidance, he had opened, at random, the sacred volume. 'If thou will be perfect, sell all thou hast and give to the poor,' 'Take nothing for thy journey,' 'If any one would come after me let him take up his cross and follow me.' Chastity, poverty, and obedience were the three vows; but poverty meant the renunciation of all property. 'Money was, as it were, infected. They might on no account accept it in alms except to aid a sick brother.'

The Benedictines offered the use of a plot of ground on which stood an abandoned church, St. Mary of the Angels. This was the first home of the order. As superior, St. Francis sent his brethren out to preach with the instruction: 'Preach peace to all men. By your gentleness lead all men to goodness, peace and union.' Thus humbly began a movement destined to be one of the greatest social and religious forces of the century. The approbation of the reigning pontiff had been won in 1209, Innocent III. perceiving in the new order an instrument especially adapted to combat certain wide-spread heresies. The confirmation of the order was given in 1216. Five thousand members met, in 1219, for the holding of the second chapter. Thousands of others, eager to enter a life of poverty, were asking admittance. In 1221 Francis founded another order, or the Tertiaries, open to men and women who, without leaving their station in life, might wish to be bound by a religious rule. An order of nuns, called the Poor Clares, had been founded in 1212. (See FRANCISCANS.) St. Francis made extended journeys, preaching his gospel of poverty and good will. His fame as a worker of miracles followed him through every land. Hisname had now become known throughout Christendom.

So many legends have been mingled with the remarkable facts connected with the life of St. Francis, that biographers have found it difficult to separate them. All agree, however, in recognizing in the Saint an ecstatic faith, the greatest humility, a most consistent practice of poverty, and a burning love for all living creatures. Astonishing stories are told of his influence over animals, which he was wont to call his brothers and sisters. The praise of creation is celebrated in the poem, *The Canticle of the Sun*, which, with others by Saint Francis, was among the first poems in the Italian tongue. Two years before his death (1226) St. Francis is said to have received the stigmata, marks on hands, feet, and side, corresponding to the wounds of Christ.

St. Francis was canonized in 1228. The literature upon St. Francis is extensive. The student will find an account of his life and place in history in Milman's *Latin Christianity*. Mrs. Oliphant and Paul Sabatier are among the latest biographers. Giotto, (1276–1336) in his famous frescos in the Church of St. Francis, at Assisi, and in Santa Croce, Florence, has given allegorical interpretations of the teachings of the saint and the portrayal of some of the striking events of his life.

FRAN'CIS OF PAOLA, SAINT. See MINIMS: FRANCISCANS.

FRANCIS, Sir PHILIP: 1740, Oct. 22—1818, Dec. 23; b. Dublin; son of the Rev. Dr. Philip Francis, who wrote a well-known translation of Horace. He was educated at St. Paul's School, London. In 1756, he obtained a place in the office of Mr. Fox, then sec. of state, which he retained under his successor Mr. Pitt. In 1760, he became sec. to the British ambassador to Portugal; and on his return to Eng-

land 1763, he received an appointment in the war-office. Ten years later, he was sent to India, as a member of the council for the government of Bengal, with a salary of £10,000. Here he came into collision with the gov.gen. Warren Hastings, and a duel was the consequence, in which Francis was severely wounded. In 1780, he resigned his situation, and 1784, entered parliament for the borough of Yarmouth, in the Isle of Wight. He never obtained a reputation as an orator, but his great abilities and extensive information aways commanded the respect and attention of the house. The prosecution of Hastings, begun 1786, was hailed by him with malignant joy. In his political opinions Francis was a decided and consistent whig, at a time when whiggism meant much the same as the radicalism of a later period. He exulted at the success of the French Revolution, was an active member of the assoc. of 'Friends of the People,' and ably supported the efforts of Fox and Grey for a reform in the representation of the nation. He withdrew from parliament 1807. Francis wrote more than 20 political pamphlets. He has also been considered by many to have the best claim to the authorship of the *Letters of Junius* (q.v.).

FRAN'CIS BORGIA, *bor'jâ*, SAINT: 1510, Oct. 10—1572, Sep. 30; b. Gandia (Valencia): gen. of the Soc. of Jesus. He was a son of John, Duke of Gandia, was educated by his uncle, abp. of Saragossa, and having a desire for a monastic life was sent by his father to the court of Charles V. to divert his thoughts, 1528. There he married a Portuguese lady of high rank, was created marquis of Lombay, and appointed master of the empress's horse. In 1535 he accompanied Charles on his expedition to Africa and 1536 to Provence, and 1539 escorted the dead body of the empress to Granada. Returning to Toledo, he was appointed viceroy of Catalonia and commander of the order of St. James. In 1543 he succeeded his father in the dukedom, resigned his viceroyalty and retired to Gandia, where on the death of his wife 1546 he joined the order of Jesuits and built a college for them. He visited Rome and gave the money to build the Collegium Romanum 1550; resigned his rank and estate to his eldest son, assumed the Jesuit habit, and was ordained priest 1551, was appointed commissary-gen. of the order in Spain, Portugal, and the Indies 1554; and was chosen its third gen. 1565. He was beatified 1624 and canonized 1671.

FRANCIS XAVIER, *zăv'ĭ-ėr*, Fr. *ksăv-ē-ā*, SAINT, Spanish Jesuit missionary: b. Castle of Xavier, Navarre, 1506, April 7; d. Island of Sancian 1552, Dec. 2. Saint Francis Xavier was born in Spain, of one of the noblest families of the kingdom of Navarre. After the usual collegiate studies in his own country, he went to Paris for a course of philosophy in the University. In spite of his extreme youth, his extraordinary ability secured for him a professorship in the affiliated College of Beauvais. It was in Paris that he met the man who shaped his destinies,

Ignatius of Loyola (q.v.). Abandoning his professorship, he took up the study of theology, practised the rudest austerities, bound himself to a life of evangelical poverty, chastity, and obedience, and with Ignatius and five other companions established what is known as the Society of Jesus.

FRANCISCAN, n. *frăn-sĭs'kăn* [from St. *Francis*]: one of an order of monks or friars founded 1209: Adj. pertaining to.

FRANCISCANS, *frăn-sĭs'kanz*, Order of (called also Gray Friars, and Minorites or Lesser Brethren): religious order of the Rom. Cath. Church, founded by St. Francis of Assisi. For an account of the establishment of the Franciscan order, and its earliest fortunes, see Francis of Assisi. The subsequent progress of the order was equally wonderful. In less than half a century it reckoned no fewer than 33 'provinces,' the aggregate number of convents in which exceeded 8,000, while the members fell little, if at all, short of 200,000. Some idea of the extension of this remarkable institute may be formed from the startling fact, that, in the dreadful plague of the Black Death in the following century, no fewer than 124,000 Franciscans fell victims to their zeal for the care of the sick, and for the spiritual ministration to the dying. But this marvellous external progress was accompanied by serious internal controversies and divisions. In the original scheme of the institute, its great fundamental characteristic was poverty, which St. Francis proposed to render in his order not only more perfect theoretically, but more systematical in its practice, than in any of the contemporary institutes. For the accomplishment of this design, the rule which he drew up contained a few brief and simple, but, understood literally, very effectual provisions; but the difficulty of their literal observance led, even in the lifetime of St. Francis, to an attempt in the general assembly of the order to introduce important modifications; and, though the authority of the founder was sufficient to prevent the adoption of these modifications during his lifetime, and though his last will contained a special clause prohibiting not merely all change of the rule, but even all interpretation of it, the attempt was renewed with still more determination under Brother Elias, his successor in the office of gen. of the order. The great subject of controversy was the nature and extent of the obligation of religious poverty, as vowed in the order. Francis desired that it should be understood in the most rigorous sense; and, in his scheme of poverty, neither the individual brethren nor the entire community could acquire or retain any right of property even in things of necessary use. The rigorous party in the order sought to carry out this principle to the fullest extent; and they contended that it was unlawful for the order to acquire a right of property in houses, convents, or even churches; restricting their right in everything which they possessed to the simple use. Several successive popes sought, by explanatory decrees, to settle the

dispute; and for a time a compromise was received, by which it was understood that the right of property in all *de facto* possessions of the order was vested in the see of Rome; but the foundations of the real controversy lay deeper than this. They regarded the practice, far more than the theory of poverty; and the disputes to which they led eventuated not only in the formation of fresh offsets from the body in the new religious orders noticed below, but also in a large, and, for a time, formidable, secession from the church in the sect of the Fraticellians. See FRATICELLIANS.

The supreme government of the Franciscans which is commonly said to be the especial embodiment of the democratic element in the Rom. Cath. Church, is vested in an elective general who resides at Rome. The subordinate superiors are, first, the 'provincial,' who presides over all the brethren in a province; secondly the 'guardian,' head of a single convent or community. These officers are elected for only two years. The provincial alone has power to admit candidates, who are subjected to a probation of two years (see NOVITIATE); after which they are, if approved, permitted to take the vows of the order. Those of the members who are advanced to holy orders take a preparatory course of study, during which they are called 'scholars;' and if eventually promoted to the priesthood, they are styled 'fathers' of the order; the title of the other members being 'brother' or 'lay-brother.'

A very important feature, however, of the organization of the Franciscans, as it subsequently became of other orders, is the enrolment of non-conventual members, who continue to live in society without the obligation of celibacy; and in general, are bound only by the spirit, and not the letter, of the rule. They are called 'Tertiaries,' or members of the Third Order of St. Francis: see TERTIARY. It is impossible to overestimate the value of this institution in the disorganized social condition of that age. The Tertiaries were bound, as the very first condition of enrolment, to restore all ill-gotten goods; to be reconciled with all those with whom they had been at feud; to devote themselves to the practice of works of Christian charity; to avoid all unnecessary expenditure; to renounce the use of personal ornaments; to hear mass daily; to serve the sick and the hospitals; to instruct the ignorant; and, in a word, to practice as far as possible in the world the substance of the virtues of the cloister. The institute, in this form, undoubtedly exercised a powerful influence in mediæval society. It counted members in every rank, from the throne to the cottage; and though it was in some instances deformed by abuses and superstitious practices, the aggregate results were undoubtedly beneficial.

The Franciscans have been the parent of many other religious institutes. The earliest of these is that of the 'Observantists,' or 'brethren of more strict observance.' The origin of this body has been already indicated. The party in the order which contended for the more rigid observance of the rule, after a protracted struggle—in which

disaffection to the church itself was often strongly exhibited—obtained a separate organization, which may be said to have been finally settled at the time of Leo X. The less rigid party, under the name of 'Conventuals,' obtained a distinct general, and an authorization for their mitigated observance of the rule. Their churches and convents admit greater richness of architecture and decoration; and they are at liberty to acquire and retain, in the name of the order, the property of these and similar possessions, all of which are renounced by the Observant Franciscans. The latter community comprises nearly 150 provinces. Their constitution is that of the original rule, as above explained. A second offshoot of the Franciscans, and in the same direction of rigorism, is that known as the 'Capuchin,' founded by Matteo de Basio, a Franciscan brother of the Observant rule, early in the 16th c. Believing himself divinely called to revive the old spirit of his order, and learning that the modern habit of the brethren was different from that of St. Francis, he began with externals, and procured for himself, and obtained the papal permission to introduce (1528), the peculiar habit, with a pointed hood or cowl (capute), from which the name of the reformed order is derived. Together with this habit, however, Matteo adopted a very rigorous and mortified course of life, in which he was joined by others of the brethren; and the reform spread so rapidly among the community, that in 1536 a general chapter of the new congregation was held. They were subject, however, to the jurisdiction of the gen. of the Franciscan order. One of the first generals of the new reform was Bernardino Ochino, afterward notable by his defection to Calvanism. After the Council of Trent, the Capuchins multiplied rapidly, though they were not introduced into France till the end of that century. A similar reform, to which the name of 'Recollets' was given (introduced into Spain by John de Guadeloupe, 1500), was approved by Clement VII. 1532; and many of the new brethren were among the first Spanish missionaries to the New World. A further development of the rigoristic spirit is the congregation of 'Discalced' or 'Barefooted' (q.v.) Franciscans. The author of this reform was a Spanish Capuchin, Peter of Alcantra. In his capacity of provincial of Estremadura, Peter introduced many reforms; and in 1555 obtained the approval of Pope Julius III. for a new rule, afterward confirmed by Pius IV.

Several orders of nuns had place in the Franciscan institute; as those of St. Clare, the Capuchinesses, the Urbanist nuns, etc.; forming part of the same general organization.

The Franciscans in these several branches, have at all times maintained their popularity in the Rom. Cath. Church. When Helyot, in the beginning of the 18th c., published his great *History of Religious Orders*, the Franciscans numbered nearly 120,000 friars, distributed over above 7,000 convents and nearly 30,000 nuns, occupying about 900 convents.

Since the French Revolution, the number has been much diminished, the order having been suppressed in more than one kingdom, but it is still one of the most numerous in the Rom. Cath Church. Many of the foreign missions are supplied mainly by Franciscans, and they possess convents in almost every part of the world.

As a literary order, the Franciscans have been eminent chiefly in the theological sciences. The great school of the Scotists takes its name from John Duns Scotus (see Scotus), a Franciscan friar, and it has been the pride of this order to maintain his distinctive doctrines both in philosophy and in theology against the rival school of the Thomists, to which the Dominican order gave its allegiance (see Thomists). In the Nominalistic controversy, the Thomists were for the most part Conceptualists; the Franciscans adhered to the rigid Realism (see Nominalism). In the Free-will question, the Franciscans strenuously resisted the Thomist doctrine of 'predetermining decrees.' Indeed, all the greatest names of the early Scotist school are the Franciscans, St. Bonaventure, Alexander de Hales, and Ockham. The single name of Roger Bacon, the marvel of mediæval letters, the divine, the philosopher, the linguist, the experimentalist, the practical mechanician, would in itself have sufficed to make the reputation of his order, had his contemporaries not failed to appreciate his merit. Two centuries later, the great Cardinal Ximenes was a member of this order. The Popes Nicholas IV., Alexander V., Sixtus IV., the still more celebrated Sixtus V., and the well-known Ganganelli, Clement XIV., also belonged to the institute of St. Francis. In history, this order is less distinguished; but its own annalist, Luke Wadding, Irish Franciscan, bears a deservedly high reputation as a historian. In lighter literature, and particularly poetry, we have already named the founder himself as a sacred poet. Jacopone da Todi, a Franciscan, is one of the most characteristic of the mediæval hymn-writers, and in later times, the celebrated Lope de Vega closed his eventful career as a member of the third order of St. Francis. We may add that in the revival of art the Franciscans bore an active and, no less a liberal and enlightened part. See Wadding, *Annales Minorum Fratrum*, 8 vols.; also Milman's *Latin Christianity*, V.

FRANCISCEA, n. *frăn-sĭs'sē-a* [named after *Francis*, Emperor of Austria, patron of botany]: genus of *Scrophulariaceæ*, tribe *Salpiglossideæ*. By some it is made a synonym of Brunsfelsia, or is merged in that genus. *F. uniflora*, is a Brazilian shrub possessing purgative, emetic, emmenagogic, and alexipharmic properties, and is nauseously bitter. The root and bark are much used for syphilis, under the name of *Mercurio vegetal* (vegetable mercury).

FRANCIS'CO, San. See San Francisco.

FRANCIS JO'SEPH, Emperor of Austria: b. 1830, Aug. 30 (began to reign 1848, Dec. 2); eldest son of Archduke Francis (son of Emperor Francis I.), and Sophia, a princess

of Bavaria. Francis was taught to speak all the various languages of his heterogeneous dominions, and only the year before the Hungarian revolution addressed the Magyar nobles at Pesth in their own language—a circumstance which secured him a certain transient popularity. In 1848 he served under Radetzky in the Italian wars. Emperor Ferdinand having, in the hour of his extremity, made certain constitutional promises to the nation, the archduchess, Francis's mother, who during the whole year had directed the schemes of the anti-revolutionary party, resolved that the fulfilment of these promises should be evaded by a change of sovereign. Ferdinand accordingly abdicated in favor of his nephew (1848), and Francis assumed the govt. as Emperor of Austria, and King of Hungary and Bohemia. Hungary, however, which had lost all faith in the House of Hapsburg, rose in arms, and refused to accede to the change of succession; and Italy again tried the fortune of war. For the struggle between Francis and the Constitutionalists of Hungary, see the biographies of Kossuth, Bem-Dembinski, Batthyani, etc. Suffice it to say that Austria triumphed in Italy, and in Hungary, through the alleged treachery of Görgei and the help of Russia. Francis now devoted himself, with characteristic persistency, to the re-establishment of 'order,' that is to say, of despotism. He dissolved the national guard, and took away the freedom of the press, and 1852, Jan. 1, abolished the constitution of his uncle, a dead-letter from the beginning. In 1853 he nearly lost his life by assassination, and in the Crimean war forfeited the respect of all the belligerents by his indecisive attitude. The *concordat* of 1855, by which certain extraordinary privileges were conferred on the bishops of the Rom. Cath. Church, was another step backward. Meanwhile the dissatisfaction of Lombardy, Venice, and Hungary hourly increased. Sardinia encouraged the national feeling in Italy, and at last, 1859, Francis hurried thoughtlessly into a war with that kingdom, which ended in the cession of Lombardy. For the war with Denmark, see SLESVIG; for the war with Prussia, and the subsequent work of reconstructing the empire, see GERMANY. Francis was crowned at Pesth, 1867, as king of Hungary. See AUSTRIA; HUNGARY; and a life of Francis by Emmer (1880).

FRANCKE, *frânk'ĕh*, AUGUST HERMAN: 1663–1727. June 8; b. Lubeck: German philanthropist, founder of the Orphan Asylum and several educational institutions at Halle. Having studied languages and theology with great application and success, he first attracted attention by his academical biblical lectures in Leipsic, begun about 1685. These were distinguished for piety, warmth, and zeal, more than for attention to the strict and dry orthodoxy then in vogue; and their popularity brought on Francke persecution as a heretic. He thought proper to yield to the storm, and withdrew 1690 to Erfurt. In 1692, he became prof. of Oriental languages in the new univ. at Halle, where he afterward was prof. of theology. He received also the pastoral charge of the suburb of Glaucha, where

the ignorance and poverty of his parishioners gave the first impulse to his benevolent labors. The neglected poor and children that came to him for alms, he gave instruction on stated days; and as others joined, paying a school-fee of a penny a week, and the numbers rose to abt. 60 he divided them into classes, and thus laid the foundation of his educational establishments. At the same time the thought suggested itself of an orphan asylum, and 1698 he laid the foundation of a special building for the asylum. Some years later he erected a Pedagogium and a Latin school with a boarding establishment. In 1714, there were 1,075 boys and 700 girls receiving instruction from 108 teachers under the direction of Francke. He had also a missionary institution for the East Indies. So high was his reputation for disinterested benevolence, and in such a practical way did he set about his undertakings, never appealing for the charitable aid of others till he had first effected something himself, that contributions flowed in from all parts of Germany, and even from abroad. Francke instituted an apothecary's shop and bookselling in connection with his other operations, and thus obtained a considerable income for their support. Amid all these voluntary labors he did not neglect his duties as professor and pastor; he preached and lectured regularly, and found time to study and write.—Francke's Institution as it now exists in Halle, embraces the orphan house and schools erected by Francke, together with others since added; the number of pupils amounting in all to more than 3,500.

FRANCKE, Kuno, American educator: b. Schleswig, Germany, 1855, Sept. 27. Was educated at Kiel; came to the United States and has been professor of German literature in Harvard University for many years. His notable book *Social Forces in German Literature* appeared in 1896; followed by *Glimpses of Modern German Culture* (1898); *History of German Literature* (1901); etc.

FRANCKEN, Frans, *frâns frânk'ĕn* (called The Younger), Flemish painter: b. Antwerp 1581, May; d. there 1642, May 6. After a trip to Italy he was received into the Guild of St. Luke at Antwerp, where he worked at first in the brilliant colors of the old masters and later in the realistic style of Rubens. Most prominent European galleries have examples of his art.

FRANCKEN, Frans (called The Third), Flemish painter: b. Antwerp 1607; d. there 1667, Sept. 2. He was admitted to the Guild of Saint Luke in 1639. His works, patterned after Rubens, are unsigned and therefore difficult of identification. Specimens of his religious subjects are to be seen at Augsburg (*Moses Striking Water from the Rock*) and Vienna, Liechtenstein collection (*John the Baptist Preaching*). In later years he also conducted a linen-draper's shop.

FRANCO, prefix *frăng'kō* [L. *Francus*, a Frank]: French, as the *Franco*-Prussian or *Franco*-German war of 1870–1.

FRANCO-GERMAN WAR.

FRAN'CO-GER'MAN WAR: between France and Germany, 1870–71. The results of the war between Prussia and Austria 1866 placed Prussia in a more important position in the eyes of Europe than it had occupied for many years. The crowning successes of the Prussian armies at Sadowa revived the long-standing enmity between France and Germany, and led Napoleon III. to consider his empire in danger of losing the military and political supremacy of Europe. Subsequent events led to the belief that Napoleon began preparing for war with Germany while the smoke of battle still hung over the bloody field of Sadowa. The Chassepot rifle, then the most destructive weapon of its kind known, was introduced in the army, and by the close of 1869 was in the hands of every infantryman. The army, apparently, had a strength of nearly 1,500,000 men: 900,000 in the active army and reserve, and 550,000 enlisted especially for frontier duty, in the national guard. The navy was quietly reorganized, strengthened, and placed on an extreme war footing. Before the close of 1869 Napoleon became fixed in the delusion that France was fully capable of waging a successful war upon Prussia. That he was grossly deceived and that France was in no condition for such a struggle were proved by the early and successive disasters of his armies, notwithstanding the brilliant achievements of some of his generals. Resting in the confidence of the invincibleness of his army and navy, Napoleon's next concern was to seek a convenient pretext for declaring war. He had vainly sought of Prince Bismarck an offensive and defensive alliance, agreeing to recognize the efforts of Germany for nullification in return for the annexation of Belgium and Luxembourg to France. Bismarck refused repeated and varying overtures, and continued to perfect his plans for a union of n. and s. Germany. As state after state gave its adhesion to the chancellor's scheme, the French became alarmed at the rapid advance of a political movement that was sure to create an adversary superior in strength to themselves. The appointment of the Duc de Gramont as minister of foreign affairs, in Emile Ollivier's cabinet, the adoption of a warlike tone in the policy of his department, and the active encouragement of belligerent sentiments by Empress Eugenie, hastened the empire to its fall. In 1870, July, Prince Leopold of Hohenzollern became a candidate for the crown of Spain, Premier Ollivier and the Duc de Gramont on learning the fact declared in the corps legislatif that such a candidature, entered upon without the knowledge of the French govt., could not be permitted by France. It was thought that King William, as head of the house of Prussia, could be induced to forbid the acceptance of the Spanish crown by Prince Leopold, and Count Benedetti was sent to Ems where King William was staying while using the waters, to make the demand. Benedetti made and repeated the demand July 9, 11, 13; the King declined to recall the consent he had given to Leopold not as king but as chief of the family; Leopold voluntarily renounced the crown July 12; Benedetti asked the king for

a pledge that he would not permit the prince to resume his candidature; the king peremptorily refused; and when Benedetti attempted a fourth audience William declined to receive him. On July 14 Prussia withdrew her representative at the French court; on the 15th the French assembly was informed of the preceding events, and despite great opposition voted 500,000,000 fr. for war; England and the pope hastened proffers of mediation; but on the 19th war was formally declared by France. While in France the war party was assuming great activity, in Berlin a feeling of calmness prevailed, as it was not believed that France would dare proceed to extreme measures. But within an hour after the reception of the news of the French appropriation for war, the capital was aroused. The king hurried from Ems, and after consulting with his advisers ordered the mobilization of the entire army of the North German Confederation, and the assembly of the federal council and the parliament. Contrary to French expectation, Bavaria, Baden, Hesse, and Würtemburg at once mobilized their armies and placed them at the disposal of King William. Other South German states followed their example, and Germany was practically united within a week by instinctive action. Instead of the grand army which official reports told Napoleon he could have in the event of war, the active army numbered only about 427,000 men; there were 87,000 regular reserves in addition, and a further force chiefly on garrison duty of 157,000. Germany had at her disposal immediately after the declaration of war an active army of 447,000 men, a first reserve of 188,000, a second of 225,000, and the landwehr. From their active forces the belligerents assembled their armies as follows: France; army of the Rhine; 1st corps under Marshal MacMahon, near Strasburg; 2nd (Gen. Frossard), toward the Prussian frontier near St. Avold; 3d (Marshal Bazaine), near Metz; 4th (Gen. L'Admirault), near Theonville; 5th (Gen. Failly), palatinate frontier near Bitsch; 7th (Gen. Douay), at Belfort; and the reserves (Gens. Bourbaki and Canrobert), at Nancy and Châlons. Germany: 1st army (Gen. von Steinmetz), as right wing, near Treves; 2nd (Prince Frederick Charles), in the Rhenish palatinate near Bitsch; 3d (Crown Prince Frederick), on the Baden frontier from Mannheim to Rastadt. Napoleon took the field in person July 29 with head quarters at Metz, and King William as commander in chief of the German armies, established himself at Mentz, Aug. 2.—Hostilities began Aug. 2, when three French divisions attacked and occupied Saarbrück, driving out a garrison of 1,300 men. Both armies advanced rapidly to the frontier. On Aug, 4 the command of the crown prince passed through the forests of Bien, reached the neighborhood of Weissenburg, attacked the French div. under Gen. Duerot, and after 5 hours' hard fighting forced them to retreat with the loss of their commander. Marshal MacMahon with the main body of his command took position at Wörth, mustering about 50,000 men to oppose the crown prince. On the 5th the Germans advanced

to Sulz, and disposed corps at Lembach, Ingolsheim, Preuschdorf, Aschbach, Scholnenburg, and Sahl. MacMahon expecting promised reinforcements refrained from attacking, but on the next morning skirmishes took place between the outposts, and though neither army was ready the firing soon grew into a general engagement. The French fought well from 9 A.M. till 1 P.M., but neither side gained material advantage. Shortly after 1 o'clock the crown prince's whole army came up. By 3½ o'clock MacMahon was forced to abandon Froschweiler, his army fled to the mountains in disorder, and the Germans gained the battle with 6,000 prisoners, 2 eagles, 6 mitrailleuses, and 35 guns. About the same time the first and second German armies had united, crossed the Saar, occupied Saarbrück, gained a stubborn fight for possession of the heights of Spichern, and forced the French to retreat toward Metz. After his victory over MacMahon the crown prince pressed forward to join the first and second armies. The three bodies were united on the 11th. The first advanced to the neighborhood of Metz on the 14th, and by attacking the 3d French corps at Courcelles prevented a French retreat to the line of the Marne and gave Prince Frederick Charles time to arrange his command to cut off the French army at Metz under Marshal Bazaine from a junction with other forces. This engagement resulted in a French loss of 4,000 men and a German of 5,000, and the driving of the French to the walls of Metz. On the 18th the French were again defeated at Gravelotte and driven within the fortifications of Metz. The first and second German armies then began the siege of Metz, while the third marched against MacMahon, who massed his army at Sedan. The Germans began the battle of Sedan Sep. 1, and on the following day the French defeated, surrounded, and without means of further resistance, were forced to surrender with their emperor at their head. The French loss in killed, wounded, and prisoners was nearly 150,000 men. After Sedan the Germans advanced to the capital, entered Rheims on the 5th, approached Paris in a half circle, established their headquarters at Versailles; and besieged Paris with a force of 122,000 infantry, 24,000 cavalry, and 622 guns. The investment of the capital necessitated the occupation of a line 50 m. long, and began Sep. 19. Strasburg was surrendered to the Germans after a long and heroic defense Sep. 27–8, Toul on the 23d, Soissons Oct. 16, Schlettstadt Oct. 24, and Metz itself with its army of 173,000 men Oct. 27. These surrenders left, for the chief of operations of the Germans, the investment of Paris. During its progress some fighting occurred at Chatillon, Meudon, Plessis-Picquet, and Moulins de la Tour, the Germans erected strong works to resist the sallies of the French Thiers begged the European courts to intervene in vain. Jules Favre sought to negotiate an armistice with Prince Bismarck without success, the Germans defeated the French at Orleans and occupied the city Dec. 4, Faidherbe was overwhelmingly defeated by Gen. von Golben in a fourth attempt to relieve Paris at St. Quentin, 1871. Jan. 19, the French made numerous sallies from thei

works about Paris, but though courageous were unsuccessful, and on Jan. 28 Jules Favre and Prince Bismarck arranged terms for the capitulation of the city by the convention of Versailles. An armistice, extended to Mar. 13, was provided in order to have the question of peace or war determined by a newly elected national assembly, the Germans took possession of the fortifications of the city, and the besieged army were declared prisoners of war. The new assembly met at Bordeaux Feb. 12, Adolphe Thiers was elected pres. of the new republic on the 17th, and a special committee signed a preliminary treaty of peace at Versailles on the 24th. By its terms France ceded to Germany the greater part of the territory of Alsace and Lorraine, and agreed to pay a war indemnity of 5 milliards fr., one milliard in 1871, the remainder within three years. The treaty was confirmed by the assembly, and Napoleon and his dynasty deposed Mar. 1, the Germans made a triumphal entry into Paris on the 1st and 2nd, withdrew from the city Mar. 3, and from Versailles Mar. 12, and taking up their march for home left the capital city to undergo a siege more terrible than their own at the hands of the French Commune.

FRANÇOIS, St., *frŏng-swâ′:* town in the French W. Indies; in Guadeloupe, on the Grand Terre, the more easterly of the twin islands into which the colony is divided by an arm of the sea known as Salt River. Pop. abt. 6,600, of which about 5,600 were slaves till 1848, the epoch of emancipation under the French Republic.

Another town St. François, in Martinique, has a good harbor on the e. coast. Pop. 5,966, of which 4,272 had been slaves.

FRANÇOIS, Kurt von, *koort fōn frân-swâ*, German explorer: b. Grand-duchy of Luxembourg 1853, Oct. 2. After active service in the Franco-Prussian war, he joined with the rank of lieutenant, the Wissmann expedition to explore the river Kassai, a tributary of the Congo, and subsequently published his work *In the Interior of Africa, the exploration of the Cassai, during* 1883–5 (1891). He then explored with Grenfell two southern tributaries of the Congo and published his *Exploration of the Tschuapa and Lulongo* (1888). He was on his return promoted to be leader of an expedition which the government despatched to the German colony of Togo, and 1890–1 accompanied the military expedition into South Africa and in 1892 traversed the Kalahari Desert.

FRANÇOIS, Luise von, German novelist: b. Herzburg, Saxony, 1817, June 27; d. Weissenfels 1893, Sept. 24. Her first considerable story, *The Last Reckenburgerin* (1871), was very warmly praised by the critics for its power in character delineation; it was followed by: *Frau Erdmuthen's Twin Boys* (1872); *Climacteric Years of a Lucky Fellow* (1877); *Judith the Housekeeper* (1868), a peasant counterpart to *The Last Reckenburgerin* and next after that her best story. She wrote a *Popular History of the*

Prussian War of Liberation 1813–15, and a comedy, *Woman's Station* (1882).

FRANCOLIN, *frăngk'o-lĭn* (*Francolinus*): genus of birds of the family *Tetraonidæ*, closely allied to partridges; natives of Europe, Asia, and Africa. One species only, the European Francolin (*F. vulgaris*), is found in the most southern parts of Europe.

FRANCOLITE, n. *frăn'ko-līt* [from Wheal *Franco;* Gr. *lithos*, a stone]: variety of apatite.

FRANCONIA, *frân-kō'nē-â* (Ger. *Franken*): name applied first to districts on both sides of the Main, originally peopled by colonies of Franks, under Thierry, eldest son of Clovis, who inherited the Germanic possessions at the death of Clovis 511. Under the Merovingian and Carlovingian dynasties, this province acquired a degree of preponderance in the state, and had the privilege of electing king of the Germans within its own territories, and crowning the sovereign by the hands of its abp. (Mayence), primate of the empire. In 911, Conrad, Count or Duke of Franconia (there is some doubt which of these was then title of the ruler of the province) was raised to the throne; and a century later, after the ducal dignity had been recognized in Franconia, the choice of the electors again fell upon the Franconian House, which, by its direct and collateral branches, gave kings and emperors to Germany from 1024 when Conrad II. began his reign, till 1250 when the indirect line of the Hohenstauffen family became extinct. During its connection with the crown, Franconia increased in extent and importance, while its great spiritual principalities of Mayence, Spires, Worms, and Würzburg acquired both wealth and political influence. In the following 200 years, the province underwent various modifications, and was subdivided into numerous territorities, as those of the Rhenish County-palatine, Nassau, Katzenellenbogen, Hainau, the landgravate of Hesse, etc., until the name of Franconia was limited to the e. portions of the ancient duchy, which included Würzburg, Fulda, Bamberg, Nürnberg, Hohenlohe, etc. In 1512, Maximillian I. re-established the circle of Franconia, which then embraced the sees of Bamberg, Würzburg, and Eichstädt, Baireuth and Anspach, and several counties and cities. With the dissolution of the empire, the name of Franconia disappeared from among the political divisions of Germany; but since 1837 it has been revived in the kingdom of Bavaria (q.v.), where those portions of the ancient Franconian province, which in modern times have been known as the circles of the Upper Main, Rezat, and Lower Main, are now designated Upper, Middle, and Lower Franconia.—*Upper Franconia* includes the n.e. portion of Bavaria. It is watered by numerous rivers, as the Maine, Raab, Saale, etc., and is intersected by the Fichtelgebirge and by the hilly ranges of the Böhmer-Franken, and Steiger-Wald. The valleys produce good crops and fruit. The dist. is rich in minerals. Cap., Baireuth

Pop. 608,116. *Middle Franconia,* which abuts upon Würtemberg, is intersected by branches of the Franconian Jura chain, but has few rivers of importance besides the Pegnitz and Altmühl, which are connected by the great Ludwig Canal. It produces good wine, but is celebrated chiefly for its hop-gardens. Anspach and Nürnberg are the principal towns. Pop. 815,895. *Lower Franconia;* with Aschaffenburg, which occupies the n.w. part of Bavaria, is the richest and best cultivated of the Franconian circles, and is celebrated for the excellence of its wines, the Steiner and Leister. The district is noted for its mineral springs at Kissingen, Brückenau, Orb, and Wipfeld. Cap., Würzburg. Pop. 650,766.—Small portions of Franconia were ceded to Prussia 1866. Pop. of the three Franconias (1900) 2,074,777.

FRANCONIA MOUNTAINS, *frăn-kō′nē-a:* western group of the White Mountain range, Grafton co., N. H.; separated at varying distances from the group by Franconia Notch; and comprising the peaks of Mts. Lafayette (the Great Haystack, 5,290 ft. high), Liberty, Cherry Mountain, and Moosilauke (4,811 ft.), and Echo Lake, Eagle Cliff, Profile Rock, Profile Lake, Bald Mountain, the Basin, Flume, Pool, and Georgiana Falls. Both the e. and w. groups are famous pleasure resorts and contain considerable iron.

FRANC-TIREURS, *frâng tē-rėr:* bands of French soldiers that sprang into existence during the progress of the Franco-German war (1870–1). They did not form a part of the regular army, and at first their military organization was very imperfect; but this afterward improved. They exercised a species of guerilla warfare, attacking small detachments of the enemy, as also single travellers, baggage-trains, etc., their attacks being too often characterized by those savageries incident to this mode of warfare. They consisted mostly of the rural population; and at first, they were not recognized by the Germans as having any military standing, and when seized they were shot; but later, when they received a better organization, and co-operated with the regular French army, such recognition was accorded them.

FRANEKER, *frân′ėk-ėr:* handsome town of the Netherlands province of Friesland, on the canal between Harlingen and Leeuwarden. It was formerly the seat of a university founded 1585 by the Frisian states on the suggestion of Prince William Louis, Count of Nassau, which ranked among its professors the eminent names of Vitringa, Schultens, Hemsterhuis, Valckenaer, and others. The university was abolished by Napoleon 1811, and 1816 the institution was transformed into an athenæum, to which a physiological cabinet and botanic garden belong. There is here a remarkable Planetarium (q.v.), made 1774–81 by Eisinga. Pop. 8,000.

FRANGIBLE, a. *frăn′jĭ-bl* [F. *frangible;* It. *frangibile* —from L. *frangĕrĕ,* to break: It. *frangere*]: that may be

broken; easily broken; brittle. FRAN′GIBIL′ITY, n. *-bĭl′ĭ-tĭ* brittleness; in *geol.*, the degree of facility with which a rock yields to the hammer.

FRANGIPANE, n. *frân′jĭ-pân*, or FRAN′GIPA′NI, n. *-pâ′nĭ* [after the first maker, the Marquis *Frangipani* of France, under Louis XIII.]: a valued perfume made from many ingredients, the most lasting known; a kind of pastry; a pudding of broken bread, etc. [L. *frango*, I break; *pānĕm*, bread].

FRANGIPANI, *frân-je-pâ′nē:* illustrious and powerful Roman House, which traces its origin to the 7th c., and attained the summit of its glory in the 11th and 12th c. In the early annals of Rome, several members of this family occupied important offices, and seem to have been public leaders. In 987, Crescenzio Frangipani successfully vindicated the prerogatives of the Roman people against the encroachments of Pope John XV. The rivalry of the Frangipani House with that of the Pietro Leoni, not only occasioned repeated civil wars in the state, but likewise several schisms in the church. The lustre of their race was finally outshone by the two great patrician families, Colonna and Orsini, whose magnificence, power, and pretension far exceeded those of the greatest citizens of Rome, Two of the last of the Frangipani who were notable are Giovanni, who captured Conradin of Hohenstaufen, and delivered him, 1268, to his sanguinary enemies; and Latino, Grand Inquisitor and Cardinal and Bishop of Ostia and Velletri. The origin of the name Frangipani is attributed to the family's benevolent distribution of bread in famine.—The Croatian family of the same name claim descent from the great original Roman House.

FRANGULIN, n. *frăng′gū-lĭn* [L. *frangĕrĕ*, to break, in *mid. L.*, to bring under cultivation]: a yellow crystalline body found in the bark of a plant, the *Rhamnus frangŭlă.* FRANGULIC, a. *frăng-gū′lĭk*, denoting an acid substance from it.

FRANION, n. *frăn′yŭn* [perhaps from F. *franc*, free, in a bad sense, as we have *free-thinker*, an atheist (see FRANK 2)]: in *OE.*, a free liver; a boon companion; a paramour.

FRANK, a. *frăngk* [F. *franc*, open, free—from mid. L. *francus*, free (see FRANCHISE)]: open; candid; ingenuous; generous; in *OE.*, without payment; free: V. to exempt, as a letter from the charge of postage; to exempt from payment. FRANK′ING, imp.: N. the indorsement which formerly exempted a letter from postage. FRANKED, pp. *frăngkt.* FRANK′LY, ad. *-lĭ*, in a frank manner; without reserve; freely; readily. FRANK′NESS, n. plainness of speech; candor.—SYN. of 'frank, a.': artless; plain; sincere; undisguised; unreserved; hearty; liberal; ready; free; unrestrained; willing; unhesitating.

FRANK, n. *frăngk* [OF. *franc*, a pig-sty]: in *OE.*, an inclosure where pigs are fattened; a pig-sty: V. to shut up

in a pig's sty; to feed high; to cram. FRANKED, pp. *frăngkt*, put within an inclosure for fattening.

FRANK, JACOB JOSEPH: see FRANKISTS.

FRANK, POSTAL: exemption from postage, of letters and other mail matter. This privilege of British peers, members of the house of commons, and many officials, was claimed by the commons, 1660, at the legal establishment of the post-office (q.v.), and was confirmed to that house by statute under George III. The whole system developed into enormous abuses; and on the introduction of the uniform penny-postage on all inland letters, 1840, the system of franking was abolished in Britain. In the United States the first privilege of the Frank was granted by congress, 1776, Jan., to all private soldiers in service for letters from and to themselves. Special, modifying, defining, and abolishing acts were adopted 1782, 1791, 1808, 1810–14, 1820, 1845, 1851, 1863, 1873, 1874, 1875, 1877, 1881, 1882, and 1883. The act of 1873, Jan. 31, abolished the privilege and compelled all persons previously authorized to use the frank postal to pay regular rates of postage; that of 1874 authorized the transmission of public documents and the *Congressional Record* at a reduced rate, when certified by a member of either house of congress or the head of a dept.: that of 1875, Mar. 3, restored the privilege to members of the existing congress for documents, the *Record*, seeds, and reports of the agricultural bureau; that of 1877, Feb. 27, provided special stamps for official letters from the executive depts.; that of 1877, Mar. 3, abolished these stamps, and substituted penalty envelopes for the depts., and authorized the free transmission of public documents by the members and clerks of both houses of congress; and that of 1879, Mar. 3, extended the use of 'penalty envelopes, to all officers of the govt., except pension-agents, and to the Smithsonian Institution. An official communication requiring answer is now accompanied by a penalty envelope, which can be used only for the special purpose under a penalty of $300. Congress by special acts has granted the franking privilege to the widows of deceased presidents.

FRANK-ALMOIGNE, n. *frăngk ăl-mŏyn'* [F. *franc*, free; Norm. F. *almoigne*, alms; Lat. *libera eleemosyna*, free alms]: ancient land tenure held 'by the services of religion' —that is, praying for the souls of the donors and their heirs. Its basis was a gift of lands to those consecrated to the service of God. By the ancient common law of England, a man could not alien lands which came to him by descent without consent of his heir, but he might give a part to God in free alms. It was an old Saxon tenure, and continued under the Normon revolution, through the great respect that was shown to religion and religious men. This is the tenure by which almost all the ancient monasteries and religious houses in Britain held their lands, and by which the parochial clergy and very many ecclesiastical foundations hold them at this day. The condition on which lands in frank-almoigne were held was, that masses and divine services should be said for the grantor and his

heirs, but no particular service was specified. At the Reformation, the nature of the services was changed, but the tenure was allowed to continue. A tenant in frank-almoigne did no fealty to his overlord, and in the event of failure to perform the service, the latter was not entitled to distrain, but might complain to the ordinary or visitor. In this respect, this tenure differed from tenure by divine service, i.e., where lands were given on condition of performing a specified service, as saying a mass on a particular day, or distributing certain alms. In this case, the tenant was bound to render fealty, and the lord was entitled to distrain on failure to perform the service. But lands held in frank-almoigne were subject to the *trinoda necessitas*, of repairing highways, building castles, and repelling invasions.

FRANKENBERG, *frânk′ėn-bĕrch:* flourishing manufacturing town of the kingdom of Saxony, on an affluent of the Mulde, 32 m. s.w. of Dresden. It has manufactures of cottons, woolens, silk-stuffs; also dye-works, and cigar manufactories. In addition to the other elementary and advanced educational establishments, Frankenberg has a trade school and an agricultural seminary. Pop. 12,700.

FRANKENHAUSEN, *frânk′ėn-how-zĕn:* small town of Germany, in Schwarzburg-Rudolstadt, on the Wipper, 27 m. n.n.w. of Weimar. It has a palace, a high school, and a seminary for teachers. Here are very productive salt springs, a large sugar-refinery, with manufactories of cigars and articles in mother-of-pearl. In the neighborhood are anthracite mines. Pop. about 6,400. Frankenhausen figures in history as the scene of a battle between the rebellious peasants under Thomas Münzer, 1525, May 15, and the Saxon, Brunswick, and Hessian troops, in which the peasants were defeated.

FRANKENIA, n. *frăng-kē′nĭ-a* [named from John *Franken*, Swedish botanist, prof. of medicine at Upsal, d. 1661]: sea-heath, typical genus of *Frankeniaceæ*, an order of hypogynous exogens. About 24 species are known, chiefly from the n. of Africa and the s. of Europe, and are mucilaginous and slightly aromatic.

FRANKENIADS, n. *frăng-kĕn′ĭ-ads:* the English name given by Lindley to the order *Frankeniaceæ*.

FRANKENSTEIN, *frânk′ėn-stīn:* small but active town of Prussia, province of Silesia, on a height on the left bank of the Pause, 37 m. s.s.e. of Breslau. Six m. s.w. of Frankenstein is the mountain fortress of Silberberg, the defenses, bastons, and casemates of which are almost entirely hewn out of the solid rock. These works were constructed by Frederick the Great, to command the passage from Bohemia. The people are engaged in the manufacture of broadcloth, linen, aquafortis, strawplait, saltpetre, etc. Pop. about 8,500.

FRANKENTHAL, *frânk′ĕn-tâl:* prosperous manufacturing town of Germany, in the Bavarian Palatinate; on the Isenach, 16 m. n.n.w. of Spires. From the town, a

canal between 50 and 60 ft. broad extends e. to the Rhine, three miles. Frankenthal has important cloth manufactures, cotton and linen weaving, and manufactures of gold and silver wire, and of needles, files, and tobacco. Pop. 16,850.

FRANKFORT, *frănk'fort:* city, cap. of Ky., and of Franklin co.; on both sides the Ky. river; on the Louisville Cincinnati and Lexington railroad; 25 m. w.n.w. of Lexington, 45 m. e. of Louisville, 70 m. s. by w. of Cincinnati. It is beautifully situated in a cluster of hills, and has a marble state-house, state prison, court-house, state institution for the training of feeble-minded children, state library, Ky. Milit. Institute, large public buildings, State Colored Normal School, King's Daughter's Hospital, street railroad, electric light plants, waterworks, etc. The industries comprise important lumber interests (cherry, walnut, ash, oak, poplar), saw and flouring mills, distilleries, and manufactures of carriages, twine, shoes, etc. Frankfort settled in 1787, became the state capital in 1792; it was occupied for a month by Confederates in 1862. Pop. (1910) 10,465.

FRANKFORT-BLACK: fine black pigment used in copper-plate engraving. It is said to be made by burning, in the manner of ivory-black, the lees of wine from which the tartar has been washed. Fine Frankfort-black, though almost confined to copper-plate printing, is one of the best black pigments, being of a fine neutral color, next in intensity to lamp-black and more powerful than that of ivory.

FRANKFURT-ON-THE-MAIN, *frânk'fûrt-on-the-mīn* (Ger. *Frankfurt am Main*): city in the Prussian province of Hessen-Nassau; on the right bank of the Main, lat. 50° 6′ n., and long. 8° 41′ e.; most ancient, and till 1866, foremost, of the four free cities of the German Confederation, and the seat of the Diet. The city lies in a wide and fertile valley at the mouth of the Main, and is encircled by a belt of villas, gardens, vineyards, and orchards. In commerce and wealth, Frankfurt-on-the-Main is one of the most important circles of Germany. Pop. 288,989.

Frankfurt-on-the-Main is the centre from which radiate public roads and railways to every part of Germany; while its site on the banks of the Main, 20 m. from its confluence with the Rhine, affording direct water-communication with the German Ocean, secures to it great advantages for commerce. Its central position has pointed it out from early ages as a suitable place for national meetings, and in 794 Charlemagne convoked here a council of 300 bishops to condemn the decree of the second council of Nicæa (7 years before) sanctioning the worship of images (see Caroline Books). In 843, Frankfurt-on-the-Main was made cap. of the e. Frankish empire, and continued so till 889, when Arnulf transferred the honor to Ratisbon; in 1257, Frankfurt-on-the-Main was raised to the dignity of a free city; and in 1356, Charles IV. confirmed by the famous 'Golden Bull' the right which it had had since the days of Frederick Barbarossa, of being the place for the

election of emperors of Germany. The Guildhall, or *Roemer*, contains the Wahlzimmer, or Hall of Election, in which the Electors (q.v.) met to deliberate on the nomination of the emperors; and the *Kaisersaal*, or Imperial Hall, in which the newly elected monarch held his public dinner, at which he was waited upon by the counts and high officers of the empire, who held their respective domains and offices in right of their performing various acts of service on that occasion. Round this hall are ranged in niches the portraits of the emperors from Conrad to Leopold II. The Golden Bull is preserved among the archives. The ancient cathedral, St. Bartholomew's, contains the chapel in which the electors accepted the emperor after he had been anointed at the high-altar. Frankfurt-on-the-Main still contains many old and narrow streets with high-gabled projecting houses, but its ancient walls and ramparts have been converted into pleasure-walks, and there are now broad quays, and wide handsome streets in the modernized parts of the city. The gates of the famous *Juden-gasse*, which were closed at night to prevent the egress of the Jewish inhabitants, were razed at the time of the French occupation 1806; and the street is now more than half demolished, almost the whole of the w. side having been pulled down. Frankfurt-on-the-Main is connected with its suburb, Sachsenhausen, which lies on the left bank of the Main, by three bridges (one dating from 1342, another finished 1878), besides the railway bridge and a wrought-iron suspension bridge for foot-passengers. There are fountains in several of the squares, one of which is adorned with a fine statue of Goethe, who was born at Frankfurt-on-the-Main, and another with a group commemorative of the invention of printing. Frankfurt-on-the-Main has several good public libraries, museums, and galleries, and many charitable institutions. It derives great wealth from its banking transactions; the aggregate capital of its bankers, among whom the name Rothschild has long stood foremost, is said to be about 100 million dollars; and the annual transactions in bills of exchange about 60 million dollars. Its manufacturing industry has greatly extended since the annexation to Prussia; to the former manufactures of snuff, tobacco, jewelry, printers' black, wax-cloths, and carpets, have been added type-founding, chemical works, and the manufacture of sewing-machines on a large scale. As a free city, Frankfurt-on-the-Main possessed a small territory of about 39 sq. m. outside its precincts, and was governed by 2 burgomasters (elected annually), 4 syndics, a civic committee of 21 members, and a legislative chamber of 57 members; the highest court of appeal was the supreme tribunal at Lübeck. The Constituent Assembly elected 1848 to frame a constitution for Germany, held its sittings at Frankfurt-on-the-Main. At the outbreak of the Austro-Prussian war 1866, Frankfurt-on-the-Main chose the side opposed to Prussia: July 16, Gen. von Falckenstein entered the city, a fine of 31 million florins was imposed; and on Oct. 18 Frankfurt-

on-the-Main was formerly incorporated with the Prussian state. It was in Frankfurt-on-the-Main at the Swan Hotel, that Bismarck and Jules Favre signed the treaty of peace between Germany and France, 1871, May 10.

FRANKFURT-ON-THE-ODER, *frânk'fûrt-on-the-ō'dėr:* capital of an extensive Prussian circle of the same name in the province of Brandenburg; on the railway between Berlin and Breslau, and about 50 m. e. of Berlin; lat. 52° 22′ n. and long. 14° 33′ e. It is a handsome, well-built town, and has three suburbs, one of which, on the right bank of the Oder, is connected with the remainder of the town by a wooden bridge. Of the six Prot. churches, St. Mary's, founded in the 13th c., is most noticeable, for its large organ, richly gilt wood-carvings, and fine stained windows. The university, founded 1506, was incorporated 1811 with that of Breslau, but Frankfurt-on-the-Oder still has its distinct gymnasium, with its branch schools. Three great fairs, annually held at Frankfurt-on-the-Oder, are still attended, as of old, by many Poles and Silesians, but sales are less brisk than in former times. Frankfurt-on-the-Oder has manufactures of ironware, porcelain, and pottery, sugar, felt, bone-dust, liqueurs, chocolate, paper, leather, silk, and wool-stuffs. Its situation, on a navigable river, connected by canals with the Vistula and the Elbe, affords great commercial and social advantages, which have given it importance from a very early period. It was a flourishing member of the Hanseatic League, and during the middle ages suffered frequently at the hands of marauding enemies. It was besieged 1430 by the Hussites, 1450 by the Poles, and 1477 by the Duke of Sagan. In the Thirty Years' War, it was frequently taken by both parties, and at the beginning of the present c. it suffered severely at the hands of the French. Frankfurt-on-the-Oder is the seat of the administrative govt., judicial tribunal, council of nobility, and boards of taxation for its circle. The village of Kunersdorf, 4½ m. from Frankfurt-on-the-Oder, was the scene of a great battle, 1759, Aug. 12, between Frederick the Great and the Russo-Austrian forces, in which the former was compelled to retreat, with great loss. Pop. (1900) 61,852.

FRANKINCENSE, n. *frăngk'ĭn-sĕns* [OF. *franc-encens*, pure incense: *frank*, free, and *incense*], (*thus*): name applied to various gum-resins which diffuse a strong fragrance in burning, and are on that account used in certain religious services. There is reason to believe that the frankincense of the Jews, also of the ancient Greeks and Romans, was chiefly or entirely the substance now known as *Olibanum* (q.v.), product of an Indian tree, *Boswellia serrata* or *thurifera* (see Boswellia). It was formerly supposed to have been obtained from the *Juniperus Lycia*, which is now believed not to yield any such product, and is a native of the s. of Europe, while the prized frankincense of the ancients was brought from the East. Several trees, however, of different nat. orders, yield substances used as frankincense instead of olibanum, in different parts of

the world, as several species of *Icica* and of *Croton* in America; and the silver-fir (see FIR) in Europe, the resinous product of which is the COMMON FRANKINCENSE of the pharmacopœias, though, in the shops, concrete American turpentine is very often sold under this name. It is used in the composition of stimulating plasters, etc. *Burgundy pitch* is made from it. It is a spontaneous exudation from the tree, hardening by exposure to the air, and generally of a whitish or pinkish color, with a rather agreeable odor and a balsamic taste.

FRANKISTS, *frânk'ĭsts:* Jewish sect, founded by Jacob Joseph Frank (1712–91; b. Poland), known also as Zoharites from their sacred book. After traveling some time in the East, Frank returned to Poland, settled in Podolia, became noted as a Cabalist, and formed a sect, comprising some rabbis, of persons learned in the so-called mystical science. He claimed to have received his doctrines from Sabbathai Scir, and published them in a book regarded by his adherents as inspired of God. He was arrested through the jealousy of the rabbis, released by the Rom. Cath. clergy, and given freedom to preach openly by the king. The subsequent severity of his followers upon adherents of other communions was checked by the papal nuncio at Warsaw; many of the sect fled to Moldaira, while others, including Frank, nominally professed Christianity. Frank was baptised and soon afterward imprisoned on charges of heresy.

FRANK'LAND, SIR EDWARD, English chemist: b. Churchtown, England, 1825, Jan. 18; d. Norway 1899, Aug. 11. He made the discovery of the union of organic radicles with metals, announcing in 1850 the preparation of compounds of zinc with methyl and ethyl. From this he deduced the conclusion that an atom of the metal could only attach itself to a definite number of the atoms of other elements, which discovery led to the theory of 'equivalents.' He was appointed professor of chemistry at Owens College, Manchester, in 1851, and there developed the process of making water gas. Becoming professor of chemistry in the Royal School of Mines in 1865 he turned his attention to water analysis, the purification of sewage and the means of preventing pollution. Subsequently he proved that compressed gases are capable of giving out a flame of constant spectrum, from which he concluded that the photosphere of the sun was atmospheric. He also investigated the chemistry of foods. He published *Experimental Researches on Pure, Applied and Physical Chemistry* (1878); *Water Analysis for Sanitary Purposes* (1880).

FRANKLANDIA, n. *frăngk-lăn'dĭ-a* [named after Sir Thomas *Frankland*, careful student of marine algæ and of botany generally]: typical genus of *Franklandidæ*, a family of *Proteaceæ*, tribe *Nucamentaceæ*.

FRANKLIN, *frăngk'lĭn:* town in Norfolk co., Mass.; on the New York and New England railroad; 20 m. n. of Providence, 28 m. s.w. of Boston. It contains Dean

Academy, an endowed coeducational institution, public library, almshouse, and has manufactures of straw, felt, cotton and woolen goods and of pianos. Franklin is noted as the home and field of the life-long labor of Nathanael Emmons, D. D. (q.v.), one of the famous theologians of New England. Pop. (1910) 5,641.

FRANK'LIN: city, cap. of Venango co., Penn.; on the Alleghany river, 120 m. by rail north of Pittsburg, and reached by the Erie, the Western New York and Pennsylvania, the Lake Shore and Michigan Southern, and the Allegheny Valley railroads. Franklin occupies the site of Fort Venango built by the French in 1753, was incorporated in 1795, and received a new charter in 1868. It has some fine public buildings, including a library and two parks. It is an important oil centre, and has flouring and planing mills, machine shops, carriage and brush factories. Pop. (1900) 7,317; (1910) 9,767.

FRANKLIN, n. *frăngk'lĭn* [OF. *frankelcyn*—from mid. L. *franchilānus*—from *francus*, free: F. *franc*, free: prov. F. *frank*, spacious, wide]: freeman and substantial householder; the English freeholder of former times, who held his lands of the crown, free (frank) from any feudal servitude to a subject-superior. Chaucer's *Franklin's Tale*, and still more his description of the franklin in the prologue to his immortal Pilgrimage, have rendered this character classical. In the whole circle of English literature there is probably no more perfect picture of the person, habits, and surroundings of a jovial old country gentleman. His beard was white as a daisy, his complexion sanguine, he loved a 'sop in wine,' and woe to his cook if his sauce were not poignant and sharp; in a word, 'he was Epicurus' owen son.' But the franklin's luxuries were not for his own enjoyment alone, for 'a householder, and that a great, was he.' His table stood 'in his hall alway,' 'ready covered all the longe day;' and

> Withouten baked meat never was his house;
> Of fish and flesh, and that so plenteous,
> *It snowed in his house of meat and drink.*

Nor was it only in dispensing good cheer that the franklin fulfilled the functions of the country gentleman of his day. At sessions, he was 'lord and sire,' and often he had been 'knight of the shire.' He had been sheriff too, and a countour and vavasour; though what these latter offices were, is a subject of controversy among the commentators. 'The dress of the franklin, according to the Duke of Sutherland's MS., was a surcoat of red, lined with blue, with bars or stripes of fringe or lace over it. He wore a small blue hat, turned up, and black boots.' (Saunders, *Cabinet Pictures of English Life*, p. 204.) Chaucer adds to his attire a knife or dagger called an 'anelace,' and a 'gipciere' or silk purse, 'white as morrow [morning] milk,' at his girdle. Mr. Saunders mentions (*ut sup.*) that, in the Metrical Chronicle of Robert de Brune, the franklin of an earlier period (13th c.) is ranked immediately after earls, barons, and lords, and was evidently

FRANKLIN.

a person of great consideration. This was very much his position in Chaucer's time; but later he seems to have lost dignity, and we find him in much lower company in Shakespeare's day. In *The Winter's Tale*, the clown is made to say (Act. v. scene 2):

> Not swear it, now I am a gentleman?
> Let boors and franklins say it, I'll swear it.

From other passages, it would seem that his position had come to correspond to that of the well-to-do yeoman. In 1 Henry IV., Act ii. scene 1, we hear of a franklin 'in the wold of Kent hath brought three hundred marks with him in gold;' and *Cymbeline* says (Act iii. scene 2), 'Provide me presently a riding suit, no costlier than is fit a franklin's housewife.' There seems no reason to think, however, that Dr. Johnson's remark that franklin is 'not improperly Englished a gentleman servant,' is warranted by his position at any period; and it certainly is not by the passage which he quotes from the *Faëry Queen:*

> A spacious court they see, etc.,
> Where them does meet a franklin fair and free.

FRANKLIN, Benjamin, LL.D., F.R.S.: 1706, Jan. 17—1790, Apr. 17; b. Boston: philosopher, statesman, scientist. He was the 15th of 17 children, was placed at school when 8 years old, and in his father's tallow chandlery when 10, and to prevent his running away to sea, was apprenticed to the printer's trade under his brother James, who conducted the *New England Courant.* He read with avidity every book that he could obtain, wrote and published in his brother's paper a number of ballads, and studied an odd volume of *The Spectator* with intense earnestness, making it the model of his style of composition. He mastered arithmetic without aid and began studying navigation when 16 years old, and about the same time read *Locke on the Understanding,* the *Port Royal Logic,* Shaftesbury, Collins, and Tyron's work on a vegetable diet, and began publishing thoughtful articles anonymously in the *Courant,* which soon attracted more than local attention. The discovery of their authorship led to a quarrel between the brothers, in the midst of which James was imprisoned for political utterances in the *Courant,* and its publication by him forbidden. Benjamin then continued the paper several months as nominal printer and publisher, but after another quarrel broke his indentures in 1723 and went first to New York and thence to Philadelphia, where he found employment as a journeyman printer. He resumed writing political articles, boarded with the father of the young woman who had ridiculed his appearance as she happened to see him passing the house eating a roll on the day of his arrival in the city; and attracting the attention of Sir William Keith, gov. of Penn., was promised by him the office of public printer, after he should visit London and purchase a printing outfit. On the strength of this promise he engaged himself to Miss Read, the young woman above referred to, went to London 1724, discovered that Gov. Keith had grossly deceived him, and

being friendless and moneyless took service with a printer and spent 18 months in London. He returned to Philadelphia 1726, became clerk in the dry-goods store of Mr. Denham who had engaged him in London, married Miss Read 1730, and with a monied friend established the *Pennsylvania Gazette.* Within a short time he attained wide fame for intelligence, industry, and efforts to promote all worthy public and educational measures. He invented a copper-plate press and engraved and printed a large amount of currency for the prov. of N. J.; established the Philadelphia library in 1731, which was incorporated in 1742, and the American Philosophical Soc., 1743, and the Univ. of Penn. 1744; invented an economical stove bearing his name; carried on a series of experiments to determine the nature of lightning; and (1752), by means of a kite with a key strung on its cord demonstrated that lightning was merely a discharge of electricity, and that the electricity of the scientific apparatus and the lightning of the clouds were identical. His kite had been provided with a pointed rod of iron and a silk string attached to a longer one of hemp. When the thunder cloud passed over the soaring kite he received a spark on his knuckles from the iron key fastened to the silk string. The success of this dangerous experiment led him to the belief that a pointed iron rod attached to the highest part of a building and extending thence into the ground would preserve the building from the lightning's stroke and lead the electric current beyond harm's point and the application of this belief of his discovery originated the lightning-rod. This scientific discovery secured for him membership in the Royal Soc. and the Copley gold medal 1753. With all these occupations he managed his newspaper with signal ability, and found time to establish an almanac —'the most celebrated of almanacs,'—for the diffusion of useful information among the people, which he at first (1732) published under the name of Richard Saunders and for 25 years thereafter under the title of *Poor Richard's Almanac.*

An interesting page in Franklin's life describes his reflections on the subject of morality and religion. He had been carefully educated in Presbyterian doctrines, but he wandered far from his early teachings, seldom attending public worship and doubting many dogmas that had been inculcated upon him. His mind was, however, thoughtfully working on moral and religious lines, and he studied himself, cataloguing religious virtues and examining himself as to how far he wandered from his own principles. He catalogued thirteen virtues which he intended to make habitual, giving a week's attention to each in succession. The list counted but twelve at first, temperance, silence, order, resolution, frugality, industry, sincerity, justice, moderation, cleanliness, tranquillity, chastity, but a Quaker friend one day told him that he was thought to be proud, and thereupon he added humility, giving an extensive meaning to the word. He said that

though he could not boast great success in acquiring the reality of this last virtue, he was able to propose opinions modestly, denying himself the pleasure of abrupt contradiction, thus making conversations go on more pleasantly, and at the same time overcoming opposition successfully. He said that he accustomed himself to say, 'I conceive,' 'I apprehend,' 'I imagine a thing to be so and so; or so it appears to me at present.' In after life he said that, in spite of natural inclination, this habit became established and 'perhaps for fifty years no one has ever heard a dogmatical expression escape me,' and to it he ascribed his influence in public councils, especially when he proposed new institutions or changes in old ones. Though, as stated above, he entertained certain religious doubts, he tells us that he never doubted the immortality of the soul, the existence of God, and his government of the world, nor the other 'essentials' of religion as he conceived them.

In 1733 when 27 years old he began studying the French, Italian, Spanish, and Latin languages, 1736 was elected clerk of the Penn. assembly, 1737 was appointed postmaster of Philadelphia, 1750 was elected member of the assembly, subsequently was appointed commissioner to negotiate a treaty with Indians, and 1753 became deputy postmaster-gen. for all the colonies. In the latter office he created a system by which the postal business of the country was carried on with a profit to the govt. for the first time. In 1754, as a deputy to the general congress held in Albany to devise means of defense against the French, he proposed a plan of union for the colonies which was unanimously adopted by the convention, but subsequently rejected by the British govt. as too democratic and by all the colonies as not sufficiently so. He then co-operated with Josiah Quincy in procuring a loan in Philadelphia for New England, and having vainly endeavored to dissuade Gen. Braddock from his proposed expedition, was afterward the mainstay of his army, and pledged his own property to the farmers for payment for horses, wagons, and provisions, furnished Braddock at Franklin's personal solicitation. The lack of popular support of Braddock's disastrous campaign arose from a dispute between the royal gov. and the assembly of Penn. concerning taxation of proprietary estates, the gov. insisting that such estates should be free of taxation, the latter that they should bear their proportionate share of the public expense. Franklin warmly advocated the assembly's position, and 1757 was sent by it to England, to argue its cause before the privy council. He applied himself directly to his public duty, and three years afterward the council decided in favor of the assembly. His visit was extended to five years, he was honored by the most eminent people of the country, he made further experiments in electricity and invented a musical instrument, and Oxford and Edinburgh Universities conferred on him their highest degrees. On his return to Philadelphia the Penn. assembly unanimously voted him its thanks.

Two years later (1764) he was again sent to England as agent for Penn. to present a remonstrance against Grenville's proposed stamp-act for defraying part of the expenses of the late war, and to prevent if possible the passage of the act. Mass., Md., and Ga., also appointed him their agent in London. Despite his efforts the act was passed 1765, but the succeeding ministry reconsidered it, and, after an argument by Franklin before the house of commons, it was repealed. In the foll wing year a bill to tax American imports and apply the proceeds to the maintenance of a civil list in each colony was carried. This act led to serious commotion in Boston, and while it was in progress Franklin received from a member of the British parliament, a number of letters written to Thomas Whately in London by Gov. Hutchinson and Lieut.Gov. Oliver of Mass., which in substance urged coercive measures against the colonies. Fr nklin sent copies of the letters to Speaker Cushing, of the Mass. assembly, who showed them to several persons, and soon the people of Mass. were convinced that the gov. and lieut.-gov. were plotting against popular liberties. The assembly petitioned the king for the removal of the inculpable officials, and when Franklin presented the petition to the privy council he was grossly insulted. Almost the entire session was taken up in abusing Franklin, and near its close the petition was rejected as scandalous. The following day Franklin was removed from the office of postmaster-gen. He remained abroad till 1775, exerting his influence to prevent a rupture between the colonies and the mother country, though subject to many spiteful annoyances by the king's party after the rejection of the Mass. petition, and spending considerable time among the learned men of France, Scotland, Ireland, and Wales. Realizing in his own mind that the colonial troubles could not be settled without resort to arms, distressed at the death of his wife, in 1774, and grieved that his son WILLIAM FRANKLIN (q.v.), who had been appointed royal gov. of N. J. should turn against him for the royal favor, he returned to Philadelphia 1775, May 5, to find that a bloody conflict had occurred 16 days previously in the streets of Lexington, Mass. The day following his arrival the Penn. assembly unanimously elected him a delegate to the second continental congress then about to assemble, and he entered upon his new duties a stanch adherent of the war party. He was appointed a member of the committees of safety and foreign correspondence, urged a declaration of absolute independence of Great Britain, assisted Jefferson in drafting the immortal document and signed it with eagerness. Soon as the Declaration was signed, Silas Deane and Arthur Lee were sent to France to negotiate an alliance, and 1776, Dec. 21, Franklin reached Paris charged with the task of securing the active aid and co-operation of the French govt. in the war. Though unofficially received at first, he induced the ministry to guarantee a loan of 2,000,000 livres a year in quarterly

payments, and to permit arms and ammunition to be sent from France and privateers to be fitted out and to take prizes into French ports. This aid was promptly given through 1777, but open sympathy was withheld for political reasons. The surrender of Gen. Burgoyne made a radical change in the condition of affairs in America, England, and France. The Americans were greatly stimulated, the English began to show alarm and sent messengers to Franklin to sound him on the possibilities of a compromise and ascertain the nature of the concessions which he might deem likely of acceptance; and the French realizing from the defeat of Burgoyne that the American people could render France large political and military advantages in the event of a war between France and England, expressed a willingness to treat with Franklin for a formal alliance. On 1778, Feb. 6, fresh negotiations by Franklin resulted in the signing of the treaty of Paris, an act of the highest importance to the cause of American independence. The following month Lord North's ministry was forced to retire, and was succeeded by one in which Franklin's friend Lord Shelburne held the portfolio of sec. of state for home and the colonies. Franklin wrote Shelburne privately in favor of peace, and the latter consulting with the cabinet sent an agent to confer informally with Franklin. Franklin demanded the cession of Canada and Nova Scotia as a means of securing durable peace, to which Shelburne emphatically demurred, while claiming that compensation should be made the British for surrendering New York and other seaports still held by royal troops. The negotiations thus inaugurated privately by Franklin and Lord Shelburne were subsequently taken up by John Jay, John Adams, and Henry Laurens, acting as commissioners on the part of the United States, and with Franklin's shrewd diplomacy and skill in handling men were carried to a completion that, by the definitive treaty of peace, 1783, Sep. 3, secured far more advantages to the United States than could have been deemed possible in view of the peculiar attitude of England, France, and Spain with reference to American territory, and their own political intrigues. Before leaving Paris Franklin negotiated treaties also with Sweden and Prussia, the latter of which Washington characterized as the most liberal that had ever been made between independent powers, and as marking a new era in international morality. Franklin's diplomatic achievements in Paris were neatly touched by Lacretelle thus: 'His virtues and renown negotiated for him; and before the second year of his mission had expired, no one conceived it possible to refuse fleets and armies to the countrymen of Franklin.' He returned to Philadelphia 1785, Sep. 14, was elected pres. of Penn. the next month, was re-elected 1786 and 87, and in the latter year was chosen a delegate to the federal constitutional convention. Two months before his death he performed his last public duty, signing a petition to congress, for the emancipation of

slaves and the abolition of the slave trade, as pres. of the Abolition Soc. Franklin was 5 ft. 10 in. in height, well formed, with light complexion and gray eyes. His attire was neat and unpretending, his manner intensely earnest, his deportment dignified yet not stiff. His remains were buried beside those of his wife in Christ churchyard on Fifth and Arch streets, Philadelphia, where both remain under plain marble slabs inscribed 'Benjamin and Deborah Franklin.'

FRANKLIN, Fabian, American mathematician and editor: b. Eger, Hungary, 1853, Jan. 18. After his graduation from Columbian University, Washington, in 1869, he engaged in civil engineering and surveying. In 1877 he became a fellow at Johns Hopkins University, and his advance to the associate and then full professorship of mathematics quickly followed. During his connection with Johns Hopkins, which lasted until 1895, he was a frequent contributor to mathematical and other journals. In 1895 he became editor of the Baltimore *News*.

FRANK'LIN, Jane, Lady: second wife of Sir John F. to whom she was married, 1826, Nov. (d. 1875); daughter of John Griffen, of London. To her unwearied energy, devotion, and hopefulness, we are indebted for the knowledge of the fate of her gallant husband. In 1848, when, owing to the long absence of news about the expedition of the *Erebus* and *Terror*, fears began to be entertained about its safety, Lady Franklin offered large rewards to any persons who should discover and relieve the missing voyagers, or who would make exertions with that end in view. From that time until 1857, when she fitted out the *Fox*, under M'Clintock, whose discoveries set all doubts about the fate of her husband's expedition at rest, Lady Franklin never rested in her efforts to incite by voice, pen, and purse, her own countrymen and Americans, to search for the missing ships. Till her last illness her interest in Arctic exploration never flagged.

FRANKLIN, Sir John, Rear-Admiral in the British navy: 1786, Apr. 16—1847, June 11; b. Spilsby, Lincolnshire; youngest son of a respectable yeoman, descended from a long line of freeholders. Franklin received the rudiments of education at St. Ives; afterward he spent two years at the grammar school of Louth. It is stated that he was intended for the priesthood, but his decided predilection for the sea, led his father to procure him, 1800, a midshipman's post on the *Polyphemus* line-of-battle ship. In the following year, Franklin's ship led the van in the desperate battle of Copenhagen. Two months afterward he was removed to the *Investigator*, then fitting out under command of Capt. Flinders, for discovery and survey of the Australian coast. In this expedition, Franklin learned the great importance of the natural sciences. On his return to England, Franklin was appointed to the *Bellerophon*, in which he acted as signal midshipman in the battle of Trafalgar (1805). He subsequently served in the *Bedford*

on various stations, and was in the attack on New Orleans 1814. In 1819, Franklin was despatched by government to Hudson's Bay, with orders to make his way thence to the Arctic Sea, and survey as much of the coast as possible. In this expedition, which brought great gain to science, and lasted about three years and a half, Franklin travelled 5,550 m. under circumstances of great hardship and privation, to which more than half his companions succumbed. On his return, 1822, Franklin was made post-capt. and elected a fellow of the Royal Society. In 1825, he co-operated (overland) with the sea-expeditions of Captains Parry and Beechey, and surveyed the N. American coast from the mouth of the Coppermine westward to about Point Beechey. Franklin's discoveries now extended over 44 degrees of longitude, or more than a third of the distance between Baffin's Bay and Behring's Strait. For these valuable explorations, in which he was engaged until 1827, he received the knighthood; the Univ. of Oxford gave him the degree D.C.L., and the French Geographical Soc. awarded him their gold medal, and later he was elected corresponding member of the Institute of France. Franklin next took active part in the Greek war of liberation. In 1836, he was appointed gov. of Van Diemen's Land, where his wise and moderate conduct gained warm approbation, and the colonists established a college and a philosophical soc. in his honor. Many years afterward they testified their grateful remembrance by subscribing £1,600 toward an expedition for his rescue. In 1845, May, Franklin, now near his 60th year, but with physical and mental powers undiminished, started with the *Erebus* and *Terror* on his last and ill-fated expedition to discover the Northwest Passage. The vessels were seen last in July of the same year. In the course of 11 years more than 20 separate expeditions, at the cost of about a million sterling, were sent out to look for the missing crews; and the discoveries of these expeditions added more to our knowledge of the arctic regions than all previous explorations had done: see NORTHWEST PASSAGE. It was not until 1859 that the fate of Franklin was ascertained by the commander of a little vessel fitted out by Lady Franklin, after hope had been declared hopeless by all else. It then appeared that Franklin had died nearly 12 years previously, fortunately spared from witnessing the awful sufferings of his men. Franklin was one of the boldest and most persevering explorers, and from the work ascertained to have been done before the collapse of the expedition, is now regarded as the discoverer of the Northwest Passage. Additional light was thrown on the fate of his crews by a memorable expedition on sledges under Lieut. Schwatka, U.S.N., 1879–80.

FRANKLIN, SAMUEL RHOADES, American naval officer: b. York, Pa., 1825, Aug. 25. In 1841 he entered the navy as acting midshipman, in 1862 became lieutenant-commander, served in the western gulf blockading squadron (1863), and as assistant to Palmer at New Orleans (1863–4)

and was hydrographer to the Bureau of Navigation 1877–80. From 1884 to 1885, when he attained rear-admiral's rank, he was superintendent of the Naval Observatory, and from 1885 until his retirement in 1887 was in command of the European station. He was president of the Washington International Marine Conference (1889), and wrote *Memoirs of a Rear-Admiral* (1898).

FRANKLIN, William: 1729–1813, Nov. 17: illegitimate son of Benjamin Franklin by an unknown mother; b. Philadelphia: last royal gov. of N. J. After his first year he was brought up by his father, became a capt. in the Penn. troops during the French war 1744–48, was comptroller of the gen. postoffice and part of the time clerk of the provincial assembly 1754–56, went to England with his father 1757, was admitted to the bar in London 1758, and appointed gov. of N. J. 1762. He turned from whig to tory after his appointment, was a strong royalist during the revolutionary war, was placed under guard and declared an enemy to his country 1776, Jan., broke his parole not to leave the province, and issued a proclamation as gov., was arrested by order of the provincial congress of N. J., and kept under strict guard at Burlington, and at E. Windsor, Conn., till his exchange 1778, Nov., and then lived in New York till 1782, Aug., when he returned to England and was pensioned. His course was a great grief to his father.

FRANKLIN, William Buel: U. S. army officer: b. York, Penn., 1823, Feb. 27; d. Hartford, Conn., 1903, March 8. He graduated at the U. S. Milit. Acad. 1843, entered the corps of topographical engineers, was on the staffs of Gens. Wool and Taylor in the Mexican war, was acting asst. prof. of natural and experimental philosophy at West Point 1848–52, lighthouse inspector and engineer 1853–57, eng. sec. lighthouse board 1857–59, eng. in charge of Capitol at Washington 1859–61, appointed col. 12th U. S. inf. and brig.gen. U. S. vols. 1861, May, commanded a brigade at Bull Run 1861, July, and a div. before Washington till 1862, Mar.; organized and commanded the 6th corps 1862, May; commanded at battles of West Point, Golding's Farm, White Oak Swamp, was promoted maj.gen. 1862, July 4, assigned to command left grand div. army of the Potomac 1862, Nov.; commanded left wing at Fredericksburg 1862, Dec. 12, 13; was on waiting orders six months; assigned to command 19th army corps 1863, Aug.; commanded expedition against Sabine Pass and was wounded 1864. Apr. 8; on leave from wound 1864, June—Nov.; was captured by Confederate raiders on a Philadelphia and Baltimore railroad train 1864, July 11, but escaped the next night; resigned as maj.gen. of vols. 1865, Nov. 9, and as col. 12th U. S. inf. 1866, Mar. 15. He was pres. of the commission for laying out Long Island City, N. Y., 1871–2, pres. of the new state-house commissioners of Conn. 1872–3, consulting eng. of the same 1874, state centennial commissioner 1876, pres. board of man. Nat. Home for disabled

soldiers 1880–87, and U. S. com.-gen. to the Paris Exposition 1899.

FRANKLIN, William Suddards, American physicist and electrical engineer: b. Geary City, Kan., 1863, Oct. 27. He graduated from the University of Kansas in 1887, and the same year was appointed assistant professor of physics there. After studying at Harvard and Cornell and the University of Berlin, Germany, he was appointed in 1892 to the chair of physics and electrical engineering in Iowa State College, remaining there till 1897, when he received his appointment to the same chair in Lehigh University. In 1901 he was a member of the jury of awards of the Pan-American Exposition. He has written *Elements of Physics* and *The Elements of Alternating Currents*.

FRANKLIN, Battle of: 1864, Nov. 30, one of the most desperate and closely contested battles of the civil war. Gen. Hood, with a Confederate force of about 43,000 men, was marching northward from Alabama toward Nashville, and Gen. Schofield, with about 25,000 men, was at Pulaski, Tenn., 80 miles south of Nashville, under orders of Gen. Thomas to delay Hood's march as much as possible. that he might concentrate a force to defend Nashville, and receive re-enforcements from Missouri. Schofield was slowly falling back before Hood's superior force to unite with Thomas, and after evading Hood at Spring Hill on Nov. 29th arrived at early dawn of the 30th at Franklin on the Harpeth River, 20 miles south of Nashville. A part of Schofield's army crossed to the north bank of the river, leaving a part south of it to cover the construction of temporary bridges on which to cross the trains and stores. Gen. Cox was left in command of the troops south of the river, and hastily threw up a line of intrenchments. The trains were nearly all over, and orders had been given Cox to withdraw at a later designated hour, when, at about 3.30 p.m., Gen. Hood came up and attacked the two brigades of Union troops, that, under Gen. Wagner, held an advanced position 280 yards beyond the main line. The attack was a most impetuous one. Wagner's men were quickly routed, much cut up, and driven in great confusion back upon the main line, the Confederates closely following to the works, over which they gallantly charged, breaking the center of the Union line and taking two batteries and many prisoners. Into the break thus made Col. Emerson Opdycke, who was in reserve 200 yards in rear of the main line, threw his Union brigade, checked the Confederate assault after a desperate hand to hand contest, in which he re-took the lost batteries, and captured 400 prisoners and 9 battle-flags. Opdycke's prompt action gave time to re-form the Union line and saved the day. The Confederates continued to make assault after assault at other points, the fighting was close and well contested, continuing far into the night, but the Union line was firmly held. At midnight Gen. Cox withdrew across the river, and the army under Schofield continued its march and joined Thomas

at Nashville on the morning of Dec. 1. The Union loss was 189 killed, 1,033 wounded and 1,104 missing. The Confederate loss is not accurately known, it is estimated at over 6,000. Gen. Schofield says 1,750 of them were buried on the field. A notable fact about the battle is the great loss of Confederate general officers, of whom five,—Gens. P. Cleburne, John Adams, O. F. Strahl, S. R. Gist, and H. B. Granbury,—were killed; and six wounded. Gen. G. W. Gordon was captured.

FRANKLIN AND MARSHALL COLLEGE: educational institution at Lancaster, Penn., composed of Franklin College, founded at Lancaster 1787, and of Marshall College, founded at Mercersburg by the Ref. Church 1836, the consolidation taking effect 1853. The colleges were originally named after Benjamin Franklin and Chief-justice Marshall. The principal buildings are: the main building, the halls of the literary societies, the Daniel School Observatory, the gymnasium, the Academy building, the De Peyster Library, and the new Science building, with admirable equipment for physics, chemistry, and biology. The Theol. Seminary of the Ref. Church in the United States, founded at Carlisle, Penn., 1825, was removed to York 1829, to Mercersburg 1837, and to Lancaster and united with Franklin and Marshall College 1872. It is under control of the Eastern, Potomac, and Pittsburgh Synods of the Ref. Church: was the birthplace of the 'Mercersburg theology.' The college in 1907 had 27 professors, 420 students, 42,000 volumes in its library, and over 1350 alumni. The Rev. Eml. V. Gerhart, D.D., LL.D., was president.

FRANKLINIC, a. *frăngk-lĭn'ĭk* [from Benjamin *Franklin* (q.v.)]: term applied to electricity generated by friction; frictional.

FRANKLINITE, n. *frăngk'lĭn-īt* [after Benjamin *Franklin*]: rare mineral, found chiefly in the zinc mines of Franklin Furnace, Sussex co., N. J., and at Altenburg, Germany. It is composed of peroxide of iron, oxide of zinc, and oxide of manganese, and is used in the manufacture of zinc paint and (the residue) Bessemer steel. It was named and described first by Samuel Fowler, M.D., who owned the Sussex co. zinc mines.

FRANK'MAR'RIAGE, (*liberum maritagium*): species of estate tail existing by the common law of England, where a man, on the marriage of his daughter or cousin, gave lands to be held in special tail. A gift in frankmarriage by a subject became impossible after the statute of *Quia emptores*, under Edward I.

FRANKPLEDGE, n. *frăngk'plĕj* [mid. L. *franciplĕgĭī* (see FRANK and PLEDGE)]: in the *law of England* before the Norman Conquest, the security whereby the members of every tything were responsible for the good conduct of each other. This responsibility, according to Hallam, consisted in every ten men in a village being answerable each for the others, so that if one committed an offense, the other nine

were liable for his appearance to make reparation. Should the offender abscond, the tything, if unable to clear themselves from participation in the crime, were compelled to make good the penalty. This law has been ascribed to Alfred the Great; but appears to have a much earlier date.

The *Court of Frank-pledge*, or *Court-leet*, in English usage, is a court of record held once in the year, within a particular hundred, lordship, or manor, before the steward of the leet: being the king's court granted by charter to the lords of those hundreds or manors. All freeholders resident in the jurisdiction are bound to attend this court; but persons under 12 and over 60 years of age are excused, and all prelates, peers, and clergymen, and women are discharged from attendance. It was the custom to summon all the king's subjects to this court, on attaining years of discretion, to take the oath of allegiance. This court has practically fallen into desuetude, and the business is discharged by the justices of the peace at general and petty sessions. See Blackstone's *Commentaries*.—Originally, the business of the court was confined to the taking securities or free pledges for every person within the jurisdiction; but this practice having fallen into disuse, the court gradually acquired a criminal jurisdiction relative to all trivial misdemeanors, concurrent with that of the sheriff's tourn.

FRANKS, n. *frăngks* [i.e. freeman (see FRANK and FRANCHISE)]: name designating a confederation of German tribes that appeared on the Lower Rhine in the 3d c., and afterward overthrew the Roman dominion in Gaul. Only the name was new; the individual tribes composing the confederation had been known on the Rhine as early as the time of Augustus. The most important were the Sigambri, Chamavi, Ampsivarii, Chatti, Chattuarii, and Bructeri of the time of the first emperors. In the 3d and 4th c., hordes of them began to pour through the low Countries into Gaul, until at last the country became their prey. After the middle of the 4th c., they appear divided into two groups, the Salians—either from the old Ger. *Sal*, or the river Sala (*Yssel*)—and the Ripuarians (*ripa*, the bank), the first inhabiting Holland and the Low Countries, the last on both sides of the Rhine as far up as the Main. Each group had its own laws, afterward committed to writing (*Lex Salica* and *Lex Ripuariorum*). Like the two peoples, these laws differ little even in detail. The Franks were a mobile, well-endowed race, forming in language and art the transition from the Low Germans to the High; and they compose to this day the ground of the population of the west of Germany as far as the Neckar, Main, Murg, and Lower Alsace; as well as the chief Germanic element of the population of n. France. For the later history of the Franks. see CLOVIS; CARLOVINGIANS; CHARLEMAGNE; FRANCE; MEROVINGIANS, etc.

Franks is the name in use among the Turks and other Eastern peoples for the English, Germans, French, Italians, etc.

FRANTIC, a. *frăn'tĭk* [L. *phrĕnētĭcus*, mad, delirious:

It. *frenetico;* F. *phrénétique;* Gr. *phrĕnītĭs*, disorder of the mind—from Gr. *phren*, the mind]: furious; outrageous; noisy; wild; transported by passion. FRAN′TICLY, ad. *-lĭ*, or FRAN′TICALLY, ad. *-ăl-lĭ*. FRAN′TICNESS, n.

FRANZ, *frânts*, ROBERT, German composer: b. Halle 1815, June 28; d. Berlin 1892, Oct. 24. He studied under Schneider at Dessau 1835–7, and in 1843 published his first set of 12 songs, which won the warm praises of Schumann, Mendelssohn, Liszt, and other masters. From then till 1868 he held various appointments at Halle. He published over 250 songs with pianoforte accompaniments, a Kyrie, and several chorales and four-part songs, besides arrangements of the vocal masterpieces of Bach and Handel. Franz's best songs rank with those of Schubert and Schumann.

FRANZENSBRUNN, *frânts′ens-brûn*, or FRANZENSBAD, *frânts′ens-bât:* small village and well-known bathing-place in Austria, on the n.w. frontier of Bohemia, three m. n.w. of Eger; amid low bare hills, and consisting of four rectangular streets lined with trees. It has four cold mineral springs, chiefly of alkalo-saline chalybeate water, deemed highly efficacious in the cure of scrofulous complaints and diseases of the skin, and used principally for drinking, but also for bathing purposes, in which case the water is heated to a temperature of 90° to 98° F. Nearly 200,000 bottles of these waters are exported annually. Franzensbrunn has also mud and gas baths.

FRANZ-JOSEF LAND, *frânts′yō′zĕf-lânt:* an Arctic archipelago, north of Nova Zembla, extending, so far as it has yet been explored, between lat. 80° and 83° N. It consists of two large masses of land, Wilczek Land to the east, and Zichy Land to the west, separated by Austria Sound, and Rawlinson Sound. Between these two sounds lies Crown Prince Rudolf Land, while to the north of this again comes Petermann Land, and to the northwest King Oscar Land. The southern shores are deeply indented with fjords; and the whole archipelago, which rises into isolated flat-topped or dome-shaped mountains of basalt, 5,000 feet high, is sheeted with ice. Owing to the open water round its shores in summer, and the comparative abundance of its animal life—bears, walruses, foxes, and numerous birds occurring—Franz-Josef Land is regarded by many experienced Artic explorers as the most favorable base whence to make an attempt to reach the North Pole. The archipelago was discovered and partly explored by Payer and Weyprecht in 1873–4; its southern shores were explored by Leigh Smith in 1880–2 and much of it by the Jackson-Harmsworth expedition in 1895–6.

FRAP, v. *frăp* [F. *frapper*, to strike: Icel. *hrappa*, to handle roughly]: in *seamen's language*, to cross and draw together the several parts of a tackle to increase the tension; to strengthen by passing a rope around; to undergird. FRAP′PING, imp. FRAPPED, pp. *frăpt.*

FRASCATI, *frâs-kâ′tē:* beautiful town about eight m. e.s.e. of Rome, on the lower heights of the Alban Hills, not far from the site of ancient Tusculum which was burned and ruined by the Romans 1191. The chief attractions of Frascati are its lovely villas and salubrious air, which render this resort in the Alban Hills the most fashionable *villeggiatura* in the vicinity of the Eternal City. The most splendid of the summer residences are the villas Aldobrandini, known also as Il Belvedere, from the commanding and noble prospect; those of Mondragon and Taverna of the Borghese family; the villas Pallavicini and Piccolomini. The cathedral contains a tablet to the Cardinal of York, for many years bishop of this diocese, and another to his brother, Charles Edward, the Young Pretender, who died here 1788. Pop. 7,000.

FRA′SER, Agnes (Frances Mac Nab), English traveler and writer: b. Halstead, Essex, 1859, Dec. 7. She studied art in London 1882–4, and has since traveled extensively in Algiers, Norway, British Columbia, Morocco, and South Africa. She has published: *No Reply* (1888); *Relics: Fragments of a Life* (1893); *On Veldt and Farm in Bechuanaland, Cape Colony, the Transvaal, and Natal* (1897); *British Columbia for Settlers* (1898); *A Ride in Morocco among Believers and Traders* (1902).

FRASER, *frā′zėr,* Alexander Campbell, d.c.l., ll.d.: educator and author: b. Ardchattan, Scotland, 1819, Sep. 3. He was educated in the universities of Glasgow and Edinburgh, obtained the univ. prize in the latter with an essay on *Toleration* 1842, was editor of the *North British Review* 1850–57, became prof. of logic and metaphysics in the Univ. of Edinburgh 1857 and dean of the faculty of arts 1859, and still (1889) holds the offices. He has been an examiner in moral science and logic at the India civil service examinations since 1872, has represented the senatus academians in the Edinburgh Univ. court since 1877, and during the past 30 years has been a frequent contributor to leading encyclopedias and periodicals, besides publishing many philosophical, educational, and biographical works. He received the degree ll.d. from Glasgow Univ. 1871, and d.c.l. from Oxford 1883. His principal productions are: *Essays in Philosophy* (1856); *Rational Philosophy* (1858); a memoir of Bishop Berkeley, with a collected edition of his works (1871–90); an annoted edition of Locke's *Essay on Human Understanding* (1894); *Philosophy of Theism* (1898), etc.

FRASER, Charles, American painter: b. Charleston, S. C., 1782, Aug. 20; d. there 1860, Oct. 5. He studied law, was admitted to the bar in 1807, but withdrew from practice in 1818, and acquired, particularly in the South, a considerable reputation as a miniature-painter. His sitters included Lafayette (1825) and most prominent South Carolinians for 50 years. He also painted interiors, landscapes, genre, and still-life scenes, and historic subjects. An exhibition of his works at Charleston in 1857

comprised 313 miniatures and 139 other canvases in oils. Publication: *Reminiscences of Charleston* (1854).

FRASER, James, English prelate: b. Prestbury, Gloucestershire, 1818, Aug. 18; d. Manchester, 1885, Oct. 22. He was educated at Lincoln College, Oxford, took orders in the English Church and was rector at Cholderton, Wiltshire, 1847–60; and of Ufton Newet, Berkshire, 1860–70. In the year last named he became bishop of Manchester, in which position he gained the approbation of churchmen and nonconformists alike. Under his administration the diocese made a most remarkable advance. Bishop Fraser was greatly interested in educational matters and visited the United States and Canada in 1865 as a commissioner of education, subsequently publishing a *Report on the Common School System of the United States and of Upper and Lower Canada* (1866). A bronze statue of Bishop Fraser stands in the square before the Town Hall of Manchester, and in the Fraser Chapel of the Cathedral of Manchester is a recumbent statue in marble of the much beloved prelate. See Hughes, *Memoir of Bishop Fraser* (1887).

FRASER, Mary Crawford (Mrs. Hugh Fraser), English novelist: b. Rome. She is a sister of F. M. Crawford (q.v.), the novelist, and was married to Hugh Fraser, English minister to Japan, who died in 1894. She is the author of *The Brown Ambassador* (1895); *Palladia* (1896); *A Chapter of Accidents* (1897); *The Looms of Time* (1898); *A Diplomatist's Wife in Japan* (1899); *The Customs of the Country: or Tales of New Japan* (1899); *The Splendid Porsenna* (1899), etc.

FRASER, William Alexander, Canadian author: b. Pictou County, N. S., 1859, March 24. He traveled widely and became a mining engineer, but subsequently turned his attention to writing. He has contributed much to English and American magazines; published an interesting collection of animal stories, *Mooswa and Others of the Boundaries* (1900), and also *The American Animal Book*, and *The Outcast* (1901).

FRASER River, *frā'zĕr:* principal stream of British Columbia, comprising in its basin the far greater part of the colony. The Fraser proper has its origin in the union of two branches, the more important of which receives its waters from a series of lakes in lat. 54°—55° n., long. about 124° 50′ w.; flows in general s.e. 260 m.; and then unites with the other branch which has its source near Mount Brown, in the Rocky Mountains, lat. 53° n., long. 118° 40′ w., flows n.w., and is 200 m. in length. The point of confluence in near Fort George, lat. about 53° 25′ n., and long. about 122° 40′ w., and hence the Fraser flows generally s. through nearly the whole length of the colony; and after a total course of 740 m. it falls into the Gulf of Georgia between Vancouver's Island and the mainland, barely n. of the U. S. boundary of 49° of latitude. Its chief affluents are the Stuart and the Chilcotin on the

right, and the Thompson on the left. Between the Stuart and the Chilcotin, and on the same side, the Fraser is joined by a small affluent, of historical interest—the West Road river, named from its having been ascended by Sir Alexander Mackenzie, on his adventurous journey 1793 from the Hudson's Bay Territories to the Pacific Ocean. The Fraser is practicable for steamboats as far up as Fort Hope, about 150 m. from its mouth, while about half that distance, as far as New Westminster, it is navigable for large ships. Above Fort Hope, all intercourse is more safely and conveniently conducted by land; as the trails even of the aborigin s still testify.

In 1857, the region of this river, in its auriferous diggings and washings, began to stand forth as the rival of California and Australia. Since then, the discoveries, originally confined to the lower basin, have steadily become more extensive and more productive. Eastward on the Thompson, and especially northward among the upper waters of the great artery of the country, the precious deposit has sometimes given almost fabulous returns. The river, its tributaries, and the numerous lakes communicating, furnish great facilities for transport of timber. The lower Fraser country is especially densely wooded. The salmon of the river are famous; and there are numerous canneries or stations where they are put into cans for exportation.

FRA'SER, Simon. See Lovat, Lord.

FRASERA, *frā'zē-ra:* genus of plants of nat. ord. *Gentianeæ*, with a 4-partite calyx and corolla, 4 stamens, and a 2-valvular capsule. *F. Walteri*, native of the Carolinas, Virginia, and great part of the basins of the Ohio and Mississippi, is often called American Calumba, the root being imported into Europe under that name. It is a pure and valuable bitter, similar in effects to gentian. The stem is herbaceous, erect, 3–6 ft. high; the leaves oval, oblong, opposite and whorled; the flowers greenish yellow. The plant is a biennial. It grows in marshy places.

FRASERBURGH, *frā'zėr-bŭr-rō:* burgh of barony and regality and seaport on the n. coast of Aberdeenshire, Scotland, 42 m. n. of Aberdeen. It is on the n. w. side of a bay two m. in extent inland immediately south of Kinnaird's Head (supposed to be the *Taixalorum Promontorium* of the Romans), on which is the Wine Tower, an old castle with a cave below. The town, originally called Faithly, was made a burgh of barony by Queen Mary 1546. Its name was changed into Fraserburgh (in honor of its proprietor, Sir Alexander Fraser of Philorth) by King James VI. 1592; and the same king, 1601, erected it into a free port, free burgh of barony, and free regality. The streets are wide and clean, with substantial houses. Fraserburgh has one of the best harbors on the e. coast. The chief exports are oats, barley, meal, potatoes, cured herrings, and cod. Fraserburgh is now one of the most successful herring-fishing stations on the e. coast of Scot-

land, the average number of boats being between 700 and 800. Since 1865, it has been connected with Aberdeen by railway. Fraserburgh has a handsome cross and town-house in the principal square, and a spacious hall belonging to the Harbor Commissioners. Pop. of Parish about 7,600, annually increased to 10,000 in the herring-fishing season, July and August.

FRASERVILLE, or Reviere du Loup, *rē-vē-ār dü loo*, Canada: a town and county-seat of Temiscouata County, Quebec, on the south shore of the St. Lawrence at the confluence of the Reviere du Loup, 116 miles below Quebec. It is on the Intercolonial Railway and is the terminus of the Temiscouata Railway. Its permanent population is almost entirely French Canadian. It has a good trade and manufactories of pulp, leather, lumber, furniture, iron products and woolens. There are three churches (2 Angelican and 1 Catholic), a convent, hospital, and collegiate institute. It has a creamery, banks, and newspapers (French), and is a popular summer resort. Pop. (1901) 4,569.

FRASIER: a strawberry flower, used by Scotch heraldic writers as synonymous with a cinquefoil.

FRATER'CULA. See Puffin.

FRATERNAL, a. *fră-tėr'năl* [F. *fraternel*—from L. *fraternālis*—from *frāternus*, brotherly—from *frātĕr*, a brother: It. *fraterno*]: pertaining to brothers; brotherly; becoming brothers. Frater'nally, ad. *-lĭ*. Frater'nity, n. *-nĭ-tĭ* [OF. *fraternite*—from L.]: a brotherhood; a society; men of the same class or profession. Fraternize, v. *frăt'ėr-nīz*, to associate or hold fellowship as brothers. Frat'erni'zing, imp. Frat'ernized, pp. *-nīzd*. Frat'erni'zer, n. *-zėr*, one who. Frat'erniza'tion, n. *-nī-zā'shŭn*, the act of uniting as brothers.

FRATICELLIANS, *frăt-ĭ-sĕl'lĭ-anz*, or Fraticelli, *frăt-ĭ-sĕl'lī* (Little Brethren): sect of the middle ages, an embodiment outside the mediæval church of the same spirit which is due, within the church, the Franciscan order with its many offshoots. The Italian word *Fraticelli* originally was the popular name of the Franciscan monks; but in the progress of the disputes which arose in the order (see Franciscans), the name was specially attached to the members of the rigorist party, and eventually to those among them who pertinaciously refused to accept the pontifical explanations of the monastic rule, and, in the end, threw off all subjection to the authority of the church. Several of the popes, especially Gregory IX. and Nicholas III. attempted to reconcile the disputants. Pope Celestine V. granted permission to the rigorists to form a separate organization, in which the rule of St. Francis might be observed in all its primitive and literal rigor. The suppression of this order by Boniface VIII. appears to have furnished the direct occasion for the secession of the extreme party from the church. They openly resisted the authority of the pope, whom they proclaimed an apostate from the faith.

The party thus formed was increased by adhesions from other sectarian bodies; as the 'Beghards' and the 'Brethren of the Free Spirit' (see FREE SPIRIT). In vain Clement V., in the council of Vienna (1311–12), put forward a new declaration regarding the rule of St. Francis. They still held their ground, especially in Sicily, central and n. Italy, and Provence. John XXII., against whom they sided actively with Louis of Bavaria, condemned them by a special bull 1317, and again in a similar document directed against Henry de Ceva, one of their chief leaders in Sicily. From these sources we learn that they regarded the existing church as in a state of apostasy; and claimed for their own community the exclusive title of the Church of God. They forbade oaths, and discountenanced marriage. They professed a divine mission for the restoration of the Gospel truth. They held that all spiritual authority was forfeited by sin on the part of the minister. They appear to have even proceeded so far as to elect for themselves a pope, with a college of cardinals, and a regular hierarchy (Wadding, *Annal. Min. Fratrum ad an.* 1374, n. 20). Their principles, in a word, seem to have partaken largely of the same fanatical and anti-social tendencies which characterized the Brethren of the Free Spirit; and in common with them, the Fraticellians were the object of a rigorous persecution about the middle of the 14th c. The principles of this sect formed the subject of public discussion at Perugia 1374 between them and a Franciscan monk named Paolucci, which appears to have ended in their discomfiture. They maintained themselves, nevertheless, in central Italy, till the 15th c., when John de Capistran received a commission to labor for their conversion in the March of Ancona; but before the beginning of the following century, they disappeared, at least from modern recognition. See Mosheim, *De Beghardis et Beguinabus* (Lipsiæ 1790); Milman's *Latin Christianity*, V.; Herzog's *Real-Encyclopädie.*

FRATRICIDE, n. *frăt′rĭ-sīd* [F. *fratricide*—from L. *fratrĭcīdă*, a brother's murderer—from *frātĕr*, a brother; *cædĕrĕ*, to kill, to murder: It. *fratricida*]: one who murders or kills a brother; the murder of a brother. FRAT′RICI′DAL a. *-sī′dăl*, pertaining to fratricide.

FRATTA-MAGGIORE, *frât′tâ mâd-jō′rā*: town of Italy, six m. n.e. of the city of Naples. It has extensive ropeworks, and furnishes great quantities of strawberries for the market of the capital. Silk-worms are reared in great quantities. Pop. about 11,000.

FRAUD, n. *frawd* [F. *fraude*—from L. *fraudem*, cheating: It. *fraude*]: deception; trick; artifice; a deceitful act by which the right or interest of another is injured. FRAUD′FUL, a. *-fŭl*, full of fraud or deceit; treacherous; deceitful. FRAUD′FULLY, ad. *-lĭ*. FRAUD′LESS, a. *-lĕs*, without fraud. FRAUD′LESSLY, ad. *-lĭ*. FRAUD′LESSNESS, n. FRAUDULENT, a. *frawd′ū-lĕnt*, founded on or obtained by fraud; unfair; dishonest. FRAUD′ULENTLY, ad. *-lĭ*, in a fraudulent manner; by deceit. FRAUD′ULENCE, n. *-lĕns.*

or FRAUD'ULENCY, n. *-lĕn-sĭ*, deliberate deceit; the overreaching of another.—SYN. of 'fraud': deceit; cheat; cunning; subtlety; subtilty; stratagem; treachery; artfulness; guile; craft; wile; sham; circumvention; imposition; insidiousness; dishonesty; knavery.

FRAUD, in law, all deceitful practices in defrauding or endeavoring to defraud, another of his known right, by means of some artful device, contrary to the plain rules of common honesty. It is condemned by the common law, and punishable according to the offense. All frauds and deceits for which there is no remedy by the ordinary course of law are properly cognizable in equity. Where a fraud can be clearly established, courts of law exercise a concurrent jurisdiction with courts of equity. Wherever fraud or surprise can be imputed to, or collected from, the circumstances, equity will interpose and grant relief against it. Where a person is party to a fraud, all that followed by reason of that fraud shall be said to be done by him. A party prejudiced by a fraud may file a bill in equity for a discovery of all its circumstances. Mere inadequacy of price alone is not a ground for a court to annul an agreement; but if there be such inadequacy as to show that the person did not understand the bargain he made, or was so oppressed that he was glad to make it, knowing its inadequacy, it will show a command over him which may amount to a fraud. If a person be fraudulently prevented from doing an act, equity will consider the act as done; and equity also relieves against bargains made under misconception of rights. In treaties, concealment of a material fact by one of the parties, in order to keep the other in ignorance, whereby to profit, is a gross fraud, and the contract will be set aside in equity. Constructive or legal fraud is applied to such acts or contracts as, though not originating in any actual evil design or contrivance to perpetrate a positive fraud or injury upon other persons, yet by their tendency to deceive or mislead other persons, or to violate public or private confidence, or to impair or injure the public interest, are deemed equally reprehensible with actual fraud, and are prohibited by law, as within the same reason and mischief as acts and contracts done *malo animo*. Gross criminal frauds are punishable by way of indictment or information. Frauds are not indictable at common law unless they be such as affect the public—as vending unwholesome provisions, or using false weights or measures; or by way of conspiracy; or unless they affect the crown or the administration of justice. See FRAUD, STATUTE OF; FRAUDULENT CONVEYANCES.

Consult: Browne, *Construction of the Statute of Frauds* (1895).

FRAUDS, STATUTE OF. Perhaps one of the most important statutes ever enacted in England or the United States was the Statute of Frauds (29 Charles II. ch. 3). It was passed in the year 1673. Its object is stated to be the 'prevention of frauds and perjuries,' and its effect

is to make writing essential to the validity of many contracts or transactions. The most important sections are those relating to contracts; namely, the 4th and the 17th, almost every word of which has been the subject of numerous decisions. It is provided by the 4th section that no action shall be brought on the contracts therein mentioned unless the agreement or some note or memorandum thereof, shall be in writing and signed by the party to be charged therewith, or some other person thereunto by him lawfully authorized. The contracts referred to are the following: (1) Any special promise by an executor or administrator to answer damages out of his own estate; (2) any special promise to answer for the debt, default, or miscarriage of another person; (3) any agreement made upon consideration of marriage; (4) any contract or sale of lands, tenements, and hereditaments, or any interest in or concerning them; and (5) any agreement that is not to be performed within the space of one year from the making thereof. This section, however, does not make the contract null and void, but only unactionable. The 17th section has reference to sales of goods for the price (or value) of £10 and upward, which are 'not allowed to be good' unless some memorandum of the bargain has been made in writing, or unless the buyer shall accept part of the goods so sold, and actually receive the same, or give something in earnest to bind the bargain, or in part payment. In the statutes of the American States the principal alteration made in these terms is by the specification of a different sum of money. The sum usually established is $50, but in some of the States it is $30, or $40. The importance of this statute has been so fully recognized in this country that it has been substantially re-enacted in every State in the Union, and in some of them its provisions have been made still more comprehensive and stringent. See FRAUD.

FRAUD'ULENT CONVEY'ANCE: conveyance intended or liable to defraud another directly or by the avoidance of a duty or debt due or incumbent on the party making it. The common law of England held all conveyances made with intent to defraud creditors to be void, and existing statutes declare that a voluntary conveyance shall be deemed fraudulent against a subsequent purchaser even with notice. These statutes have been generally adopted in the United States at least as the basis of all enactments on the subject in the different states, except that in the matter of voluntary conveyances the subsequent purchaser has notice, especially where there is a good consideration. It is held in both countries that while a voluntary conveyance is void as regards purchasers and creditors, it is valid as between the immediate parties.

FRAUGHT, a. *frawt* [Sw. *frakta;* Ger. *frachten,* to freight: Ger. *fracht;* F. *fret,* the loading of a wagon or ship, the money paid for conveyance (see FREIGHT)]: filled; stored; laden; OE. pp. of the v. *freight:* N. in *OE.,* for freight: V. in *OE.,* to burden. FRAUGHT'ED, pt. pp. burdened.

FRAUGHTAGE, n. *frawt'āj*, in *OE.*, a cargo; the lading of a ship.

FRAUNHOFER, *frown'ho-fėr*, JOSEPH VON: 1787, Mar. 6—1826, June 7; b. Straubing, Bavaria: practical optician. In 1799 he was apprenticed to a glass-cutter in Munich, and 1806 was received, as a working optician, into the establishment of Reichenbach and Utschneider at Benedictbeurn (removed 1813 to Munich). While there, he acquired considerable wealth through his inventions, and became proprietor of the establishment. He invented a machine for polishing parabolic surfaces, and was the first who succeeded in polishing lenses and mirrors without altering their curvature. His prisms also were celebrated, being free from the blebs and striæ often seen in those of English manufacture. His inventions are numerous, and include a 'heliometer,' a 'micrometer,' an 'achromatic microscope,' besides the great parallactic telescope at Dorpat. But that which has rendered Fraunhofer's name celebrated throughout the scientific world, is his discovery of the lines in the spectrum. The cause which had hitherto prevented the accurate determination of the power of a given medium to refract the rays of light and separate the different colors which they contain was chiefly the circumstance that the colors of the spectrum have no precise limits, and that the transition from one to another is gradual and not immediate; hence, the angle of refraction cannot in the case of large spectra be measured within 10′ or 15′. To obviate this, Fraunhofer made a series of experiments for the purpose of producing homogeneous light artificially, and unable to effect his object in a direct way, he did so by means of lamps and prisms. In the course of these experiments he discovered that bright fixed line which appears in the orange color of the spectrum when it is produced by the light of fire. This line enabled him afterward to determine the absolute power of refraction in different substances. Experiments to ascertain whether the solar spectrum contains the same bright line in the orange as that produced by the light of fire led him to the discovery of the innumerable dark fixed lines in the solar spectrum, consisting of perfectly homogeneous colors.

FRAUN'HOFER'S LINES. See SPECTRUM.

FRAUSTADT, *frow'stât* (Polish, Wszowa): town of Prussia, govt. of Posen, in a sandy plain on the Silesian frontier, 55 m. n.w. of Breslau. It has important grain markets, and near it are many windmills. Pop. 6,851.

FRAXETIN, n. *frăks'ĕ-tĭn* [L. *fraxinus*, an ash-tree]: $C_{10}H_8O_5$: substance obtained with glucose by digesting fraxin with dilute sulphuric acid.

FRAXIN, n. *frăks'ĭn* [*Fraxĭnus*, an ash tree]: a crystalline substance obtained from the bark of the ash-tree and horse chestnut, forming a complex glucoside.

FRAXINELLA, n. *frăks-ĭ-nĕl'la* [dim. of L. *fraxinus* ash-tree]: name given to two rutaceous plants, *Dictamnus*

fraxinella and *D. albus*, cultivated for their fragrant leaves and flowers: see DITTANY.

FRAXINUS, n. *frăks'ĭ-nŭs* [L. an ash-tree]: genus of plants belonging to the order *Oleaceæ* (Oliveworts): see ASH.

FRAY, n. *frā* [contr. of AFFRAY, which see: comp. Gael. *freadh*, pillage, plunder]: a broil; a quarrel; a contest: V. to terrify; to frighten.—SYN. of 'fray, n.': difference; dispute; altercation; feud; combat.

FRAY, v. *frā* [F. *frayer*, to rub, to wear—from L. *frĭcārĕ* to rub]: to rub; to wear away by rubbing; to tease out or unravel an edge of cloth: N. a rough or jutting part which requires to be dressed and rubbed off. FRAY'ING, imp. FRAYED, pp. *frād*. FRAYED, a. or FRAISED, a. *frāzd*, having the rough or undressed parts taken off; having the threads at the edges rough and sticking out. FRAYINGS, n. plu. *frā'ĭngz*, the rough parts scraped or rubbed off.

FRAZEE, LAWRENCE FISHER, American inventor: b. New Brunswick, N. J., 1813, May 22; d. Jersey City, N. J., 1896, Oct. 10. He became connected with the New Brunswick Steamboat and Transportation Company about 1835; and continued with its successors, the Camden and Amboy, and the Pennsylvania railroad companies till his death. During the Civil war he had command of the transport Massachusetts. He was the inventor of numerous useful appliances.

FRAZER, JOHN FRIES, American scientist: b. Philadelphia, 1812, July 8; d. there 1872, Oct. 12. Grandson Gen. Persifor Frazer of Revolution. Was graduated with highest honors at the University of Pennsylvania in 1829, and afterward completed courses in both law and medicine. With Professor A. D. Bache he made the first researches on magnetics in the United States. In 1836 he became one of the two assistants on the First Geological Survey of Pennsylvania. After filling for some time a professorship in the Philadelphia High School, in 1844 he succeeded Professor Bache as professor of natural philosophy and chemistry in the University of Pennsylvania, serving until his death; and from 1855–68 also as vice provost. In 1857 he received the degree of LL.D. from Harvard. He was an active member of the American Philosophical Society (its vice-president in 1855), the Academy of Natural Sciences, and the Franklin Institute (the editor of its journal from 1850 to 1866), and one of the charter members of the National Academy of Sciences.

FRAZER, PERSIFOR, American geologist, son of preceding: b. Philadelphia, 1844, July 24. After graduation (1862) from the University of Pennsylvania, served during Civil war in the South Atlantic squadron (1862–63) as aide, United States coast survey; in the cavalry during Gettysburg campaign, and as ensign in the navy to the end. Was mineralogist and metallurgist to the United States geological survey (1869–70), professor of chemistry in the University of Pennsylvania (1870–74), assistant

geologist second geological survey of Pennsylvania, 1874–82. He was the first foreigner to receive the degree of Docteur ès-Sciences Naturelles from France, which also gave him the decoration of the golden palms of the Academy. He served as vice-president, representing the United States in the International Geological Congress of 1888 (London), and of 1897 (St. Petersburg). He has written extensively for scientific periodicals, published five volumes of Reports of the Geological Survey of Pennsylvania; *Tables for the Determination of Minerals* (1874); and *Bibliotics, or the Study of Documents* (1894).

FRAZ'ERA. See FRASERA.

FRAZIER'S FARM, BATTLE OF: in the war of secession, 1862, June 30. At early morning the retreating army of the Potomac crossed White Oak Swamp, while an advanced portion had reached James river, when the Confederate army under Gens. Jackson and Longstreet, divided into two columns, attempted to intercept McClellan's army. Longstreet flanked the swamp and bisected the Quaker road along which McClellan was passing. Hastening forward the Confederates arrived within a mile of the junction of the Quaker and New Market roads at noon, found the Union forces in possession, and Longstreet began the attack without awaiting Jackson's appearance. Jackson was prevented joining Longstreet, the Confederates were defeated in their purpose, and McClellan reached Malvern Hill and re-established communication with the James river the next morning. Confederate loss 2,000; Union 1,800. See CHICKAHOMINY, BATTLES OF.

FREAK, n. *frēk* [AS. *frec*, bold, rash: Icel. *frekr*, voracious, greedy: Ger. *frech*, saucy: comp. Gael. *fraoch*, an outburst of anger or petulance]: a flighty humor or fancy; a whim; a sudden fancy; a prank. FREAK'ISH, a. capricious; whimsical. FREAK'ISHLY, ad. *-lĭ*. FREAK'ISHNESS, n.—SYN. of 'freak': caprice; humor; whim; fancy; fickleness; variableness; changeableness; folly; sport.

FREAK, v. *frēk* [It. *fregare*, to rub, to streak; *frego*, a dash, a stroke]: in *OE.*, to streak; to variegate; to checker. FREAK'ING, imp. FREAKED, pp. *frēkt*. *Note.*—FREAK 2 may be connected with FRECKLE, which see.

FREAR, WALTER FRANCIS, American jurist: b. Grass Valley, Cal., 1863, Oct. 29. He was graduated at Yale University in 1885, and at the Yale Law School in 1890; was made second judge of the first circuit court of Hawaii, in 1893, January, first associate justice in the supreme court of the Republic of Hawaii in 1896, January. He was a member of the commission to recommend to Congress legislation for Hawaii, in August, 1898, and became chief-justice of the Supreme Court of Hawaii in 1900, July, and governor of Hawaii, 1907. He is the author of *Evolution of the Hawaiian Judiciary;* etc.

FRECHETTE, LOUIS HONORE, French Canadian author: b. Levis, Que. 1839, Nov. 16. He was educated at Quebec Seminaire and Nicolet College; called to the bar

1864 but practiced journalism in Chicago for some years: edited various journals and contributed to many more in both prose and verse. His published works include: *Mes Loisirs* (1863); *La Voix d'un Exilé* (1866–8); *Pêle-Mêle* (1877); *La Légende d'un Peuple* (1887); *Les Fleurs Boréales* (1880); *Les Oiseaux de Neige* (1880); *Les Feuilles Volantes* (1891); in prose, *Masques et Fantomes; Vieux Cartons; Lourdes; Letters à Basile* (1872); *Histoire Critique de Rois de France* (1881); *Originaux et Détraques* (1893); *Lettres sur l'Education* (1893); *Christmas in French Canada* (1899); *Le Nöel au Canada* (1900); Dramas, *Veronica; Papineau; The Thunderbolt;* Translations, Howell's *Chance Acquaintance;* Cable's *Old Creole Days.*

FRECKLE, n. *frĕk'l* [Icel, *frekna*; Norw. *frukne*, freckles: Ger. *fleck*, a spot, a stain: Gael. *bhreac=frĕck*, speckled, spotted]: a yellowish spot on the skin; any small discolored spot on the skin: V. to produce freckles on. FRECK'LING, imp. FRECKLED, pp. *frĕk'ld*: ADJ. having small yellowish spots on the skin or surface. FRECK'LY, a. *-lĭ*, covered with freckles: see MACULÆ.

FREDERIC, HAROLD, American journalist and novelist: b. Utica, N. Y. 1856, Aug. 19: d. London, England, 1898, Oct. 19. He was for many years London correspondent of the New York *Times*. His writings include: *Seth's Brother's Wife* (1887); *The Lawton Girl* (1890); *In the Valley* (1890); *The Return of the O'Mahoney* (1892); *The New Exodus* (1892); *The Copperhead*, a tale of the Civil War (1895); *Marsena* (1895); *The Damnation of Theron Ware* (1896); *March Hares*, a study of contemporary social life (1896); *Gloria Mundi* (1898); *In the Market Place* (1899).

FREDERICIA, *frĕd-ėh-rĭsh'ē-a*: seaport and fortress of Denmark, on the e. coast of the province of Jutland, on a projecting tongue of land, at the n. entrance to the Little Belt. It is fortified with nine bastions and three ravelins on the landside, and with two bastions toward the sea. It has several ecclesiastical edifices, a hospital, and a custom-house, at which toll used to be paid by ships passing through the Little Belt. Tobacco is grown and manufactured here. Pop. 12,700.

FREDERICK, *frĕd'ėr-ĭk* (Ger. FRIEDRICH, *frēd'rĭch*) I., Emperor of Germany—surnamed BARBAROSSA (Redbeard), 1121–89 (Emp. 1152–90): succeeded his father, Frederick Hohenstaufen, as Duke of Swabia 1147; succeeded his uncle, Conrad III., as emperor. He was one of the most enlightened and powerful rulers who ever swayed the imperial sceptre. In his desire to emulate Charlemagne, and to raise the secular power of the empire in opposition to the arrogated supremacy of the papal chair, he was brought into constant collision with his Italian subjects. Six times he was compelled to cross the Alps at the head of great armies, in order to chastise the refractory cities of Lombardy, which were ever ready, on the slightest provocation, to throw off their allegiance. In the early periods of his

reign, he visited their defection with undue severity; but in his latter days his conduct toward them was characterized by a generous leniency and a politic liberality in advance of his age; and in 1183, he convoked a council at Constance, in which he finally agreed to leave the Lombard cities the right to choose their own municipal rulers, and to conclude treaties and leagues among themselves, though he retained his supremacy over them, with the power of imposing certain fixed taxes. The difficulty of settling the Italian differences was as usual aggravated in Frederick's time by the attitude assumed by the occupants of the papal chair, and at one time Italy was distracted by the pretensions of two rival popes, Alexander III. and Victor IV., who each excommunicated the other, and hurled the anathemas of the church against their several opponents; and it was not till 1176 that Frederick, after his defeat at Lignano, by consenting to acknowledge Urban II., successor of Alexander III., as the rightful pope, was enabled to turn his attention to Germany. By his energetic measures, he succeeded in thoroughly humbling his troublesome vassal, Henry the Lion, Duke of Brunswick, and thus crushing the Guelfic power in Germany. Frederick made Poland tributary to the empire, raised Bohemia to the rank of a kingdom, and the markgrafdom of Austria into an independent hereditary duchy. In 1189, Frederick having settled the affairs of the empire, and proclaimed universal peace in his dominions, resigned the government to his eldest son Henry, and at the head of 100,000 men, set forth for the Holy Land, accompanied by his second son, Frederick of Swabia, founder of the order of Teutonic Knights. After gaining two great victories over the Saracens at Philomelium and Iconium, he was drowned in a river of Syria, while trying to urge his horse across the stream. His remains were rescued by his son, and buried at Tyre. The death of Frederick, which led to the dispersion of the Crusaders before any material advantage had been obtained over the Infidels, excited the deepest grief in Germany, where his memory has always been cherished as that of the best and wisest of his race. Frederick was a patron of learning, and enacted many admirable laws, some of which are still in force.

FRED'ERICK II., Emperor of Germany: 1194–1251 (Emp. 1212–51): grandson of Emperor Frederick I.; and son of Emperor Henry VI. and of Constance, heiress of Sicily. His mother secured the favor of Pope Innocent III. for her infant son, by conceding many important privileges to the papal chair; and after the civil war which had raged in Germany for eight years between the rival claimants of the throne, Philip of Swabia and Otho IV., was ended by the agency of Innocent, Frederick succeeded (1212) in obtaining the support of the German electors. On his promising to undertake a crusade, the pope sanctioned his coronation at Aix-la-Chapelle, 1215. Like his grandfather, Frederick was actuated by an ardent desire

for the consolidation of the imperial power in Italy at the expense of the pontificate, which he wished to reduce to the rank of a mere archiepiscopal dignity. Having secured the nomination of his son Henry to the rank of king of the Romans, and appointed Archbishop Engelbert of Cologne his vicegerent, he left Germany; and after having been crowned emperor at Rome 1220, applied himself to the task of organizing his Italian territories. He founded the university of Naples, gave encouragement to the medical school of Salerno, invited to his court and patronized men of learning, poets, and artists, and commissioned his chancellor, Petrus de Vineis, to draw up a code of laws to suit all classes of his German and Italian subjects. Frederick's schemes for the union of his vast and widely scattered dominions were, however, frustrated by the refractory conduct of the Lombard cities, and still more by the arrogance of the popes Honorius III. and Gregory IX., who threatened him with excommunication unless he fulfilled his pledge of leading a crusade. Being compelled to depart on this expedition, he made the necessary preparations for its prosecution; but a pestilence broke out among his troops in the Morea, and he returned in haste to Italy, only to be again forced away by papal threats. This second attempted crusade proved more successful; and 1228, notwithstanding the machinations of the pope, and the treachery of the Knights Templars, Frederick extorted a ten years' truce from the Moslem ruler, and forced him to give up Jerusalem and the territory around Joppa and Nazareth. The rest of his life was spent in bringing his rebellious Lombard subjects to subjection, and in counteracting the intrigues of the pope, the rebellion of his eldest son, and the treachery of his friend and minister, the Chancellor de Petrus de Vineis, who was suspected of attempting to poison him. Frederick, who died suddenly, the possessor of seven crowns, was the most accomplished sovereign of the middle ages, for he not only spoke and wrote the six languages common to his subjects, but he was famed for his talents as a minnesinger, and for his skill in all knightly exercises, while he wrote elaborate treatises on natural history and philosophy. His strong sympathies with his Italian mother-land, and his unremitting endeavors to establish a compact and all-supreme empire in Italy, were the causes, not only of his own misfortunes, but of the miseries which he brought upon the German empire, by embroiling him in costly wars abroad, and leading him to neglect the welfare, and sacrifice the interests of his German subjects. See for Frederick I. and Frederick II., Raumer, *Geschichte der Hohenstauffen*; Sismondi, *Italian Republics*, and *Europe in the Middle Ages;* Voigt's *Lombardenbund;* Funk, *Geschichte Kaiser Friedrich* II.

FREDERICK III., Emperor of Germany (Frederick IV. as King of Germany, Frederick V. as Duke of Austria): 1415–93 (Emp. 1440–93): son of Duke Ernst, of the Styrian branch of the House of Hapsburg. At the age of 20, he

undertook an expedition to the Holy Land; and on his return, in conjunction with his factious brother, Albert the Prodigal, he assumed the government of his hereditary dominions of the Duchy of Austria, the revenues of which scarcely exceeded 16,000 marks. On the death of Emperor Albert II., he was unanimously elected as his successor; and two years afterward, 1442, he was solemnly crowned at Aix-la-Chapelle; ten years later, he received the imperial crown at the hands of the pope at Rome, and 1453 secured the archducal title to his family. His reign was a prolonged struggle against domestic intrigues and foreign aggressions. One of his most troublesome opponents was his brother Albert, who refused to give up the provinces which he held until he had received a large sum of money; but notwithstanding these causes of annoyance, and while John Hunyades Corvinus at the head of a Hungarian army overran Austria and laid siege to Vienna, and the usurper Sforza possessed himself of the imperial fief of Milan on the extinction of the male line of the Visconti, Frederick remained absorbed in his own private studies, or roused himself only to attempt, by the aid of foreign mercenaries, to recover the crown-lands of which the House of Austria had been deprived. His brother Albert's death 1463 secured him a short reprieve from internal disturbances, and gave him possession of Upper Austria; but he was repeatedly embroiled in quarrels with Podiebrand, King of Hungary, and Matthias Corvinus, King of Bohemia; the latter of whom several times besieged Vienna, and finally dispossessed him of every town of importance in his hereditary domains. Meanwhile, the Turks were suffered to push their conquests in Europe until they had advanced in 1456 to Hungary, in 1469 to Carniola, and in 1475 to Salzburg, though a vigorous opposition at the outset would easily have put a stop to their encroachments. On the death of Matthias, 1490, Frederick recovered Austria, but he was obliged to acknowledge Prince Ladislaus of Bohemia as king of Hungary. This mortification was soon followed by his death, after an inglorious reign of 53 years. Frederick never lost an opportunity of promoting the aggrandisement of his own family, which he materially secured by marrying his son and successor, Maximilian, to Mary, the rich heiress of Charles the Bold of Burgundy. Frederick was temperate, devout, parsimonious, scrupulous about trifles, simple in his habits, pacific in his disposition, and naturally averse to exertion or excitement. From this time, the imperial dignity continued almost hereditary in the House of Austria, which has perpetuated the use of his favorite device, A.E.I.O.U., *Austriæ Est Imperare Orbi Universo.* See Æneas Sylvius, *Historia;* Coxe, *House of Austria.*

FREDERICK IV., King of Germany: see FREDERICK III., Emperor of Germany.

FRED'ERICK I., first King of Prussia; Frederick III. as Elector of Brandenburg: 1657–1713, Feb. 25 (Elector 1688–1713, King, 1701–1713); son and successor of Fred-

FREDERICK THE GREAT.

eric William of Brandenburg. He had the same zeal as his father for the aggrandisement and amelioration of his dominions; but differed from him in his admiration of Louis XIV., whose pomp and luxurious display he imitated at his own court. He supported William of Orange in his attempt on England, and gave him a subsidy of 6,000 men, which, under the command of Marshal Schomberg, contributed to the victory at the Boyne which decided the fate of James II. Frederick was always ready to lend troops and money to his allies; he sent 6,000 of his best men to aid the Imperialists against the Turks; and though he met with the same ingratitude as his father, he succeeded, by treaties, exchanges, and purchases, in considerably extending his territories; and after many years' negotiations, he induced the Emperor to agree to the 'Crown Treaty,' by which, in return for permission to assume the title King of Prussia, Frederick bound himself to furnish certain contingents of men and money to the imperial government. As soon as this treaty had been signed, Frederick hastened in midwinter with all his family and court to Königsberg, where, 1701, Jan. 18, he placed the crown on his own head. Frederick did much to embellish Berlin, where he founded the Royal Acad. of Sciences, and the Acad. of Painting and Sculpture, erected several churches, and laid out numerous streets. He established a court of appeal at Berlin, built the palace of Charlottenburg, and founded the Univ. at Halle; but his actions were generally influenced by a love of display; and his vanity, with his neglect of those who had served him, made him personally unpopular, though his patriotic love of Germany redeemed, in the eyes of his countrymen, many of his bad points.

FRED'ERICK II., surnamed 'The Great,' King of Prussia: 1712–86 (reigned 1740–86): son of Frederick-William I. and the Princess Sophia-Dorothea, daughter of George I. of Great Britain. His early years were under the restraints of an irksome military training, and a rigid system of education. His impatience under this discipline, his taste for music and French literature, and his devotion to his mother, gave rise to dissensions between father and son, and resulted in an attempt on the part of Frederick to escape to the court of his uncle, George II. of England. Being seized in the act, his conduct was visited with still greater severity, and he himself was kept in close confinement, while his friend and confidant, Lieut. Katt, was executed in his sight, after having been barbarously ill-treated by the king. According to some reports, the prince's life would have been sacrificed to the fury of his father, had not the kings of Sweden and Poland interceded in his favor. Having humbly sued for pardon, he was liberated, and allowed to retire to Ruppin, which, with the town of Rheinsberg, was bestowed upon him 1734. Here he resided till the king's death, surrounded by men of learning, and in correspondence with Voltaire, whom he especially admired, and other philosophers; but on his

accession to the throne he laid aside these peaceful pursuits, and at once gave evidence of talent as a legislator, and of determination to take an active share in the political and warlike movements of the age. His first military exploit was a victory at Mollwitz over the Austrians, 1741, which nearly decided the fate of Silesia, and secured to Prussia the alliance of France and Bohemia. Another victory over Empress Maria Theresa's troops made him master of Upper and Lower Silesia, and closed the first Silesian war. The second Silesian war, which ended 1745, from which Frederick retired with augmented territories and the reputation of being one of the first commanders of the age, was followed by a peace of 11 years, which he turned to the improvement of the various departments of government and of the nation generally, to the organization of his army, and the indulgence of his literary tastes. The third Silesian war, 'the Seven Years' War,' was begun 1756 by the invasion of Saxony—a step to which Frederick was driven by the fear that he was to be deprived of Silesia by the allied confederation of France, Austria, Saxony, and Russia. This contest, one of the most remarkable of modern times, secured to Frederick a decided influence in the affairs of Europe generally, as the natural result of the pre-eminent genius which he had shown both under defeat and victory; but though this war crippled the powers of all engaged in it, it left the balance of European politics unchanged. It required all the skill and inventive genius of Frederick to repair the evils which his country had suffered by the struggle. In 1772, he shared in the partition of Poland, and obtained as his portion all Polish Prussia and a part of Great Poland; and by the treaty of Teschen, 1779, Austria was obliged to consent to the union of the Franconian provinces with Prussia, and he was thus enabled to leave to his nephew and successor a powerful and well-organized kingdom, one-half larger in area than it had been at his own accession, with a full treasury, and an army of 200,000 men. He died at the château of Sans Souci, 1786, Aug. 17. Frederick the Great is said to have 'inherited all his father's excellences and none of his defects.' His courage, fertility of resource, and indomitable resolution, cannot be too highly praised. Not the least wonderful of his achievements was his contriving to carry on his bloody campaigns without incurring a penny of debt. A true spirit of self-sacrifice—though not, perhaps, for highest ends—was in him. Never was king more liberal towards his subjects. In Silesia, where war had nearly ruined the inhabitants, he once remitted the taxes for six months, and in Pomerania and New Brandenburg for two years, while his government was carried on with rigid economy, such as Europe had never before witnessed. But not only was his government economical, it was essentially just. Religious persecution was unknown, civil order everywhere prevailed; property was secure, and the press was free. On the other hand,

Frederick's faults were far from being few. Education had made him French in all his ideas and prejudices; and in those days to be French was to be skeptical, not so much with the skepticism that often arises from intellectual awakening, as with the skepticism that consists in moral stupor. He was utterly unconscious of the grand intellectual and spiritual life that was about to spring forth in Germany and to make it again the guiding-star of Europe as in the days of Luther. He was, in fact, almost ignorant of his native language, which moreover, he despised as semi-barbaric; though before his death Goethe had published his *Götz von Berlichingen*, *Sorrows of Werther*, *Iphigenia in Tauris*, and many of his finest lyrics; while Kant, besides a variety of lesser works, had also given to the world his masterpiece, the *Critique of Pure Reason*. Frederick was a very voluminous writer. Of his numerous works, all in French, *Mémoires pour servir à l'Histoire de Brandenbourg*, and *Histoire de la Guerre de Sept Ans*, show perhaps the greatest powers of description, but all evince talent of no common order. The Acad. of Berlin, by the direction of Frederick-William IV., brought out a fine edition of his collected works in octavo and quarto, 1846–51. Frederick left no children, and was succeeded by his nephew, Frederick-William II. See Carlyle, *History of Frederick II.;* Macaulay's *Essay;* and the lives of Dohn, Preuss, Förster, Kugler, Droysen, Klopp, Pelletan (1878).

FRED'ERICK I., German Emperor, and (III.) King of Prussia: 1831, Oct. 18—1888, June 15 (reigned 1888, Mar. 9—June 15); son of William I., Emperor of Germany and King of Prussia, and of Princess Augusta of Weimar. He was known before his accession, as the Crown Prince Frederick William; entered the military service at an early age, rose to the rank of gen., and held numerous appointments, but did not show noticeable military skill till the war between Prussia and Austria 1866, when he commanded an army of 120,000 men and decided the contest by a sudden and brilliant movement at Sadowa July 3. In the Franco-German war he commanded the third German army of 200,000 men and 500 guns; dispersed the French at Weissenburg 1870, Aug. 4; defeated the United army corps of Gens. MacMahon, Failly, and Canrobert at Wörth Aug. 6; in conjunction with Prince Frederick Charles successfully engaged the greater part of MacMahon's army near Sedan Sep. 1, made the difficult crossing of the Meuse river; entered Versailles Sep. 20; and invested Paris till the conclusion of peace. He was created field marshal of Prussia Oct. 28, and of Russia Nov. 8. In 1878 when Emperor William was wounded by Nobeling, Frederick was appointed regent during his father's recovery. He married Victoria Adelaide, Princess Royal of Great Britain, 1858, Jan. 25, by whom he had seven children. In the winter of 1886–7 he was seized with a throat affection which developed into a cancer and caused his death. Frederick went to London 1887, June 13, and after an operation spent some time recuperating

in Scotland, but 1888, Feb. 8, tracheotomy had to be performed, and Frederick began growing rapidly weaker. Emperor William died Mar. 9, and on the following day Frederick started for Berlin to assume the crown. Despite the rapid progress of the disease, he applied himself to his public duties with much zeal till the early part of June. Frederick had for years had the respect of the civilized world as a man of noble private character, a superb military officer, a careful student of public affairs, a prince fervent in patriotism and hospitable to liberal ideas of government. His death was keenly felt by his nation and mourned throughout Europe. His short reign stands as a pathetic episode in German history, brightened by his unwavering fortitude. Frederick was succeeded by his son, William II., who entered upon his reign with all the martial spirit of the Hohenzollerns.

FRED'ERICK I., King of Denmark: 1473–1533 (reigned 1523–33). During the disturbed reign of his nephew Christian II., he behaved with so much circumspection, that the choice of the nation fell upon him when the king was deposed. He showed great cruelty to his unfortunate relative, whom he detained in close captivity; but he was a politic ruler. In 1527 he embraced the Lutheran faith, which he established in his dominions by most arbitrary measures.

FREDERICK II., king of Denmark, the son and successor of Christian III.: b. 1534; d. 1588. He ascended the throne in 1559. He was a great friend of learning, and was a patron of Tycho Brahe and other men of science. He waged a long war with Sweden, which ended in 1570.

FRED'ERICK III., King of Denmark: 1609–70 (reigned 1648–70); son of Christian IV. The wars of his father's reign had brought the country into great embarrassment; and notwithstanding all his efforts to maintain peace, Frederick was continually embroiled in the quarrels of other nations, and during his reign Copenhagen was twice besieged by the Swedes under their warlike king Charles Gustavus; nor was peace re-established till after the death of Charles. The reign of Frederick was rendered memorable by the change in the governmental constitution, which after having been in some degree elective, was at once changed into a hereditary and absolute monarchy by the voluntary act of the commons and clergy, who, from abhorrence of the nobility, surrendered to the crown the liberties and prerogative which they had hitherto enjoyed, and made the sovereign absolute and irresponsible.

FREDERICK IV., King of Denmark: b. Copenhagen 1671, Oct. 11; d. there 1730, Oct. 12. He ascended the throne on the death of Christian V. in 1699. He leagued against Charles XII. of Sweden, who forced him to make peace; but when Charles fled to Turkey, Frederick drove the Swedes out of Norway, and concluded a favorable peace; retaining possession of the duchy of Schleswig.

FRED'ERICK V., King of Denmark: 1723–66 (reigned

1746–66); son and successor of Christian VI. He was reputed one of the best and wisest monarchs of his time. Denmark owed to him the increase of her national wealth, and the establishment of various branches of commerce and manufacture. Frederick established a Greenland Company, opened the American colonial trade to all his subjects, founded the military acad. of Soroe, in Denmark, and caused schools to be opened at Bergen and Trondhjem, in Norway, for the instruction of the Laplanders. He established academies of painting and sculpture at Copenhagen, and sent a number of learned men—among whom was Niebuhr, father of the historian—to make explorations in the East.

FRED'ERICK VI., King of Denmark: 1768–1839, Dec. 3 (regent during his father's insanity 1784–1808, reigned 1808–39); son of Christian VII, and Caroline Matilda of England. In his reign, feudal serfdom was abolished, monopolies were abrogated, the criminal code was amended and the slave-trade was prohibited earlier than in any other country. In 1800, Denmark joined the maritime confederation formed by Russia, Sweden, and Prussia, which led to retaliation on the part of England, to the seizure by that power of all Danish vessels in British ports, and to the despatch of a powerful fleet, under Sir Hyde Parker and Nelson, to give efficacy to the peremptory demand that the regent should withdraw from the convention. His refusal to accede to this demand was followed by a fierce naval engagement, in which the Danish fleet was almost wholly destroyed. A peace was concluded on the regent's withdrawal from the confederation; but in consequence of his persisting in neutrality, instead of combining with Great Britain against Napoleon, the war was renewed 1807 by the appearance, before Copenhagen, of a British fleet, bearing envoys, who summoned Frederick to enter into alliance with England, and to surrender his fleet and arsenals, and the castle of Cronborg, commanding the Sound. On his refusal, Copenhagen was bombarded for three days, the arsenals and docks destroyed, and all the shipping disabled, sunk, or carried to England. Smarting under the treatment which he had experienced from the English, the Danish monarch became the ally of Napoleon, and suffered proportionally after the overthrow of his empire. In 1814, Norway was taken from Denmark by the allies and given to Sweden. The state became bankrupt, and many years passed before order could be restored to the finances. Notwithstanding Frederick's autocratic tendencies, he so far yielded to the movements of the times as to give his subjects, 1831, a representative council and a liberal constitution.

FRED'ERICK VII., King of Denmark: 1808–1863, Nov. 15 (reigned 1848–63); son and successor of Christian VIII. The principal events of his reign were the wars and diplomatic negotiations arising out of the revolt of the duchies of Holstein and Slesvig and the vexed ques-

tion of the succession to Denmark proper and the duchies on the death of the king and of his uncle the heir-presumptive, both of whom were childless. Notwithstanding the heavy expenses of the war, the material prosperity of the country increased during Frederick's reign.

FRED'ERICK IV., Elector Palatine; 1574–1610 (ruled 1502–1610); son of Elector Louis VI. and Elizabeth of Hesse. He succeeded his father at the age of 9 years under the guardianship and regency of his uncle John Casimir, and on the death of the latter, 1592, took sole charge of the govt. The Protestant union of Germany was formed through his instrumentality 1601, and during his reign he heartily supported the Protestant cause. Many refugees of that faith sought an asylum and protection under his jurisdiction in Mannheim, and he raised that town to the rank of a city 1606.

FRED'ERICK V., Electoral Prince Palatine: 1596–1632 (ruled 1610–23; also King of Bohemia 1619–20). He married, 1613, Elizabeth, daughter of James VI. of Scotland and I. of England, through whose ambitious counsels he was induced to take a prominent part in the proceedings of the union of the Protestant princes of Germany, and finally, though against his own inclinations, to accept the title of king of Bohemia. His complete defeat at the battle of Prague (1620) ended his short-lived enjoyment of the regal crown, of which he retained no other memorial but the mocking title of 'The Winter King.' Ridicule and contumely followed him wherever he went, and the rest of his life was spent in exile under the ban of the empire, and with no resources beyond those which he could obtain from the generosity of his friends. In 1623, he was declared to have forfeited his electoral title and his dominions in the Palatinate, which were conferred upon his cousin Maximilian of Bavaria, head of the Catholic league.

FRED'ERICK III., Elector and Duke of Saxony: 1463–1525 (ruled 1486–1525); son and successor of Duke Ernst (see ERNST, Elector and Duke of Saxony). He succeeded his father 1486, divided his Ernestine possessions with his brother, John the Constant, founded the Univ. of Wittenberg 1502, promoted the Reformation, and was much attached to Melanchthon and Luther; secreted the latter in Wartburg castle after his proscription in the Diet of Worms; made a pilgrimage to the Holy Land; was appointed imperial vicar three times, and on the death of Maximilian I. magnanimously refused the imperial crown and by his vote secured it for Charles V.

FRED'ERICK III., Elector of Brandenburg: see FREDERICK I., King of Prussia.

FRED'ERICK-CHARLES: 1828, Mar. 20—1885, June 15: Prus. prince: son of Prince Charles (brother of Emperor William I.). In his early youth, he manifested a great liking for warlike occupations; and the first Slesvig-

Holstein war (1849) saw him in the field as captain, and not without honor to himself; in the campaign in Baden he also gathered laurels and honorable wounds; and in the second Slesvig-Holstein war his name became famous through the storm of the Düppel entrenchments. But his chief title to fame is from his part in the campaign of 1866 against Austria, where he commanded one of the invading armies, and where his able generalship contributed not a little to the final success of the war. He has indeed been blamed for excess of caution in advancing through Bohemia to the rendezvous at Gitschin, where his more prompt appearance, it is said, would have saved the Silesian army from the danger of serious disaster which it encountered in passing the defiles; but it may, in fairness, be assumed that the caution was necessary until the contrary is proved. He commanded the second German army in the Franco-German war, and the investing forces when Metz capitulated, 1870, Oct. 27, and next day was made field-marshal by King William, afterward German emperor. Frederick-Charles was married to Marie Anna, Princess of Anhalt, 1854. In 1879, March, his third daughter, Louise Margaret, was married to the Duke of Connaught.

FREDERICK CITY, or FREDERICK: city, cap. Frederick co., Md.; on the Baltimore and Ohio railroad; 44 m. n.w. of Washington, 61 m. w. by n. of Baltimore, 3 m. from Monocacy battlefield, 12 m. from South Mountain battlefield. It is situated in a fertile valley, and is the seat of Frederick College (1797), Women's College of Frederick, state deaf and dumb institution, and other educational establishments. It is a manufacturing centre with foundries, tanneries, planing mills, several flouring mills, and sash, coach, brick, and iron factories. Francis S. Key, Chief Justice Roger B. Taney, and Barbara Frietchie are buried there. Frederick City was occupied by the Confederate army under Gen. Lee, part of 1862, Sep., and by the Union army under Gen. McClellan remainder of month. Pop. (1910) 10,411.

FREDERICKSBURG: city of Spottsylvania co., Va.; on the s. bank of the Rappahannock river, 92 m. from its mouth; 13 m. s. of the Potomac river, 60 m. s. of Washington, 61 m. n. of Richmond; on the Richmond Fredericksburg and Potomac, and the Potomac Fredericksburg and Piedmont railroads. It is at the head of tidewater, and by the construction across the river of a dam, 900 ft. long and 18 ft. high, providing a fall of 48 ft. 2 in., has valuable waterpower. The manufacturing industries include flouring mills, the Fredericksburg brand of wheat flour being noted, iron foundries, farming-implements, silk, woolen, leather, paper, excelsior, cigar, and carriage factories. Fredericksburg has fine public institutions, and is noted for its cemeteries. Pop. (1910) 5,874.

FREDERICKSBURG, BATTLE OF: 1862, Dec. 13, one of the bloodiest and worst directed battles of the civil war, fought at Fredericksburg, Spottsylvania Co., Va.,

FREDERICKSBURG.

60 miles north of Richmond, and 54 miles south of Washington, between the Army of the Potomac, under command of Gen. Burnside, and the Army of Northern Virginia, commanded by Gen. Lee. On Nov. 9, Gen. Burnside succeeded Gen. McClellan in command of the Army of the Potomac, at which time that army was at and near Warrenton. Lee's army was divided, Longstreet's corps around Culpepper C. H., 20 miles south, and Jackson's corps in the Shenandoah Valley. On Nov. 15, Burnside began to move down the north bank of the Rappahannock River, intending to cross the stream at Fredericksburg, where, it is contended, Gen. Halleck had assured him pontoon bridges would be in readiness, on which the army could cross the river, and march thence on Richmond. Gen. Sumner at the head of the 2d and 9th corps, arrived at Falmouth, opposite Fredericksburg, on the 17th, but the promised pontoons were not there, and after Burnside's refusal to permit him to cross without them, he took position on Stafford Heights. Gens. Hooker and Franklin, with two corps each, followed Sumner. When Gen. Lee knew of Burnside's movement he ordered Longstreet to hasten from Culpepper to Fredericksburg, and by forced marches that officer reached there on the 21st, and occupied the heights back of the town, which he strongly fortified. Jackson arrived from the Shenandoah, nine days later, and took position on Longstreet's right. It was not until Dec. 11 that Burnside was ready to cross the river; on that day and the next the 1st, 2d, 6th and 9th corps crossed without serious opposition and occupied Fredericksburg. Hooker, with the 3d and 5th corps, crossed on the 13th. At noon of the 13th, Gen. Franklin, who with the 1st and 6th corps, held the left of the Union line, and was facing 'Stonewall' Jackson at Hamilton's crossing, sent Meade's division into action, supported by the divisions of Gibbon and Doubleday. Meade succeeded in breaking Jackson's line, taking prisoners and colors, and was soon joined by Gibbon, but both were driven back and offensive fighting on that part of the field ceased. On the Union right Sumner assaulted Marye's Hill, which Longstreet had strongly fortified. At the base of the hill was a sunken road, along which was a stone wall, behind which was Confederate infantry. Batteries of many guns on the high ground swept all the approaches. Against this position, the strongest on Lee's line, Sumner threw his men; assault followed assault, but no impression could be made. The loss of over 5,300 men attested the gallantry of Sumner's men. Gen. Hooker now came up and protested that further assault would be a useless waste of life, but Burnside insisted and three divisions of Hooker's command assaulted and were repulsed with a loss of 2,000 men. Against this Union loss of 7,300 men, the Confederate loss was less than 1,000. The fighting ceased at dark with the Union army everywhere repulsed. Gen. Burnside in a spirit of desperation proposed to renew the fighting next day by leading his old 9th corps in another

assault, but was dissuaded by Gen. Sumner and other officers. He withdrew to the north bank of the river on the night of the 15th, after leading the Army of the Potomac to one of its most bloody and humiliating defeats. Burnside's army numbered about 120,000 men of whom less than one-half were actually engaged. Lee's army numbered 78,500 men, of whom 28,000 were engaged. The Union loss was 1,284 killed, 9,600 wounded, and 1,769 missing. The Confederate loss was 595 killed, 4,061 wounded, and 563 missing.

FRED'ERICK-WIL'LIAM I., King of Prussia: 1688–1740 (reigned 1713–40): son and successor of Frederick I. of Prussia. In almost every particular he was the opposite of his father. He was simple, and almost penurious in his habits, attentive to business, passionately fond of military exercises, averse from mental cultivation, and fond of the society of the low and illiterate, while he carried to the utmost his ideas of arbitrary power and the divine right of kings. The public events of his reign were of little importance, although he was continually implicated in foreign wars, and he supported the cause of Stanislaus of Poland, and assisted Austria in her contests with France. By his economy and reforms in the finances, he was able to indulge his taste for the organization of military forces, while his childish love of tall soldiers induced him to connive at the most flagrant outrages both at home and abroad for kidnapping tall men and forcing them into his service: the result of this system was, that he left at his death a well-drilled army of 70,000 soldiers, of whom a large proportion were men of gigantic stature. What was of more consequence to his son and successor was, that his exchequer contained 9,000,000 thalers, and that his kingdom had attained an area of more than 45,000 sq. m., and a pop. more than 2,240,000. See Morgenstern *Ueber Friedrich Wilhelm I.* (Braunsch. 1793); F. Förster, *Gesch. Friedrich-Wilhelm's I.* (Pots. 1835); Carlyle, *Hist. of Friedrich II., called Frederick the Great.*

FRED'ERICK-WIL'LIAM II., King of Prussia: 1744–97 (reigned 1786–97); nephew of Frederick the Great. After a prolonged estrangement between his uncle and himself, he regained the good-will of the king by his valor in the war of the Bavarian succession 1778; but though he succeeded to a well-consolidated power and an overflowing treasury, he had not capacity to maintain his favorable position. Futile or hastily undertaken wars wasted his resources; so that at his death, instead of the overplus of 70,000,000 thalers that had been bequeathed to him, the state was hampered with a debt of 22,000,000. His predilection for unworthy favorites, the establishment of a strict censorship of the press, and the introduction of stringent ecclesiastical enactments, alienated the people from him, though his natural mildness of disposition had excited the sanguine hopes of the nation on his accession. Frederick-William shared in the second partition of Poland, 1793, and thus gained considerable addition to his king-

dom, which by purchase, inheritance, and other means, was augmented during his reign by the acquisition of more than 46,000 sq. m. of territory, and 2½ millions of inhabitants. The chief internal improvements in his reign were the introduction of a new code of laws, and a less onerous mode of raising the taxes.

FRED'ERICK-WIL'LIAM III., King of Prussia: 1770–1840 (reigned 1797–1840); son and successor of Frederick-William II. He early took part in the administration, and on his accession at once dismissed the unworthy favorites of the preceding reign. By his efforts to maintain neutrality in the great European struggle that had been excited by the wars and victories of the French, he awakened the distrust of all the great anti-Gallican powers of Europe, and disappointed the petty German princes, who had looked upon Prussia as their protectress against foreign encroachments. Napoleon's promises of support and friendly intentions soon changed this neutrality to an alliance with France, and Prussia was rewarded by the acquisition of Hildesheim, Paderborn and Münster, which added nearly 4,000 sq. m. of territory, and half a million of inhabitants to the kingdom; but at length the repeated and systematic insults of Napoleon, who despised Frederick-William, while he professed to treat him as a friend, roused the spirit of the nation, and the king saw himself obliged, 1805, to agree to a convention with Russia, the real object of which was to drive Napoleon out of Germany. Again the duplicity of Prussia led her to make a new treaty with France, by which she consented to receive the electorate of Hanover, and thus involved herself in a war with England. The insults of Napoleon were redoubled after this fresh proof of Frederick-William's indecision. The Prussian nation, headed by the queen, now called loudly for war, and at the close of 1806, the king yielded to these appeals. Hostilities began without further delay; but the defeat of the Prussians at Jena, Eylau, and Friedland, compelled their unfortunate monarch to sue for peace. The Prussian army was annihilated and the whole of the kingdom, with the exception of a few fortified places remained in the power of the French. By the intervention of Emperor Alexander of Prussia, a peace was concluded, known as the Treaty of Tilsit, by which Frederick-William lost the greater part of his realm, and was deprived of all but the semblance of royalty; but though for the next five years he was a mere tool in the hands of Napoleon, who seized every opportunity of humbling and irritating him, his spirit was not subdued, and his unremitting efforts at this period of his life to reorganize his enfeebled government by self-sacrifices of every kind, endeared him greatly to his people. The disastrous termination of Napoleon's Russian campaign was the turning point in the fortunes of Prussia. Frederick-William joined the alliance against France, and hostilities were carried on with signal success, until they culminated in the great battle of Leipsic, in which the

Prussians, under their general, Blücher, earned the greatest share of glory. The peace of Vienna restored to Prussia almost all her former possessions, while the part taken by the Prussian army under Blücher in gaining the victory of Waterloo, by which Napoleon's power was finally broken, raised the kingdom from its abasement. From that time, Frederick-William applied himself to the improvement of his exhausted states; but though before the French revolution of 1830 Prussia had recovered her former material prosperity at home and political consideration abroad, the king adhered too strictly to the old German ideas of absolutism to grant his people more than the smallest possible amount of political liberty. He had indeed promised to establish a representative constitution for the whole kingdom, but this promise he wholly repudiated when reminded of it, and merely established the *Landstände*, or Provincial Estates, a local institution, devoid of all effective power. His support of the Russian govt. in its sanguinary methods of crushing revolutionary tendencies in Poland showed his absolutist tendencies, and his dread of liberal principles. Frederick-William concluded the great German commercial league known as the *Zollverein* (see GERMANY), which organized the German customs and duties in accordance with one uniform system.

FRED'ERICK-WIL'LIAM IV., King of Prussia; 1795, Oct. 15—1861 (reigned 1840, June 7—1858); son and successor of Frederick-William III. He was carefully educated, fond of the society of learned men, and a liberal patron of art and literature. He showed much of his father's vacillation of purpose; and though he began his reign by granting minor reforms, and promising radical changes of a liberal character, he always, on one plea or other, evaded the fulfilment of these pledges. He was possessed by high but vague ideas of 'the Christian state,' and showed through life a strong tendency to mystic pietism. The one idea to which he adhered with constancy was that of a union of all Germany into one great body, of which he offered himself to be the guide and head. He encouraged the duchies of Holstein and Slesvig in their insurrectionary movement, and sent troops to assist them against Denmark; but he soon abandoned their cause, and being displeased with the revolutionary character of the Frankfurt Diet, refused to accept the imperial crown which it offered him. The conspiracies in Prussian Poland were suppressed with much rigor; and the popular movement which followed the French revolution of 1848 was met by the king at first with resolute opposition; but when the people persisted in demanding the removal of the troops from the capital, and enforced their demand by storming the arsenal, and seizing on the palace of the Prince of Prussia (afterward Emperor William I.), who was at that time especially obnoxious to the liberals, he was compelled to comply with their wishes. Constituent assemblies were convoked only to be dissolved when the king recovered his

former security of power, and new constitutions were framed and sworn to, and finally modified or withdrawn. After the complete termination of the revolution in Germany, the revolutionary members of the Assembly of 1848 were prosecuted and treated with severity, the obnoxious 'pietistic' party and the nobility were reinstated in their former influence at court, and the freedom of the press and of religious and political opinion was strictly circumscribed. The life of the king was twice attempted; first 1847 by a dismissed burgomaster, named Tschech; secondly 1850, by an insane discharged soldier of the name of Sefeloge. In 1857, Frederick-William was seized with remittent attacks of insanity; and in 1858 he resigned all management of public affairs to his brother and next heir, who acted as regent of the kingdom till his own accession 1860, as William I.

FRED'ERICK-WIL'LIAM, Elector of Brandenburg ('the Great Elector'): 1620–88 (ruled 1640–88). On his accession, he found an empty exchequer, the towns and cities depopulated, and the whole electorate devasted by the ravages of the Swedish and Imperialist armies during the Thirty Years' War, which was not yet concluded; while a portion of his inheritance had even been confiscated by the Swedes. His first acts were to regulate the finances, and to conclude a treaty of neutrality with Sweden, which gave him leisure for the organization of his army, and the repeopling of the deserted towns and villages by immigration. By the treaty of Westphalia, through which he lost several important places, he recovered the eastern portions of Pomerania, Hohestein, the bishoprics of Halberstadt, Minden, and Kamin, as lay-principalities, and the reversion of the archbishopric of Magdeburg. In the course of ten years he had, by the help of his generals, Derfflinger, Schomberg, and Kannenberg created an army of 25,000 men, organized on the Swedish model; and having been constrained to enter into an alliance with Charles X., he co-operated with him in the taking of Warsaw, effected at the cost of a most sanguinary engagement 1656. In return for this co-operation, Frederick-William secured the emancipation of his Prussian duchy from its former dependence on Poland. The aggressions of Louis XIV. on the Rhenish frontier alarmed the elector, who induced the emperor, the king of Denmark, and the elector of Hesse-Cassel, to enter into a league against France. The result was unfavorable to the cause of the German princes, and Frederick-William was obliged to content himself with making highly disadvantageous terms. The war was soon renewed, and Brandenburg was again a prey to the incursions of the Swedes, who, at the instigation of Louis, advanced upon Berlin, laying waste everything on their march. The elector, who had taken up his winter-quarters in Franconia, hurried across the Elbe at the head of his cavalry, and having signally defeated the Swedes, drove them from his dominions. If the emperor had been true to his word, and supported him, Frederick-William might

have made head against the French; but being forsaken by the other German princes, and his dominions overrun by the troops of Louis, he was obliged to agree to the treaty of St. Germain, by which he restored all his conquests to the Swedes, in return for the withdrawal of the French army, and the payment to him of an indemnity of 300,000 crowns. From this time forth, Frederick-William applied himself to the task of consolidating the prosperity of his dominions. During his reign, he more than tripled the area of his territories, and by his generous reception of 20,000 French Protestants after the revocation of the Edict of Nantes, and the encouragement which he afforded to the immigration of Dutchmen and other foreigners, he augmented the population of his states, and introduced numerous industrial arts among his subjects. He founded the university at Duisburg, and the royal library at Berlin, and reorganized the universities of Frankfurt-on-the-Oder, and Königsberg, opened canals, established a system of posts, and greatly enlarged and beautified Berlin. He left a well-filled exchequer and a highly organized army. See Orlich, *Gesch. des Preuss. Staats im* 17 *Jahrh.*

FRED'ERICK-WILLIAM, Duke of Brunswick: 1771–1815, June 16. He entered the Prussian service at an early age, and was actively engaged with the army during the war with France 1792, and again 1806, and was taken prisoner with Blücher at Leipsic. He was prevented by the veto of Napoleon from acceding to the dukedom. Being resolved to take part in the war against the French, he raised a free corps in Bohemia, and threw himself into Saxony, which he was, however, speedily compelled to evacuate. After the total defeat of the Austrians 1809, the duke determined to leave Germany; and with his corps of 700 'black hussars,' and 800 infantry, he began his masterly retreat. After various skirmishes, in one of which he defeated the Westphalian commander Wellingerode and a picked detachment of troops, he reached Brunswick, in the neighborhood of which he gained a victory at Oelper over 4,000 Westphalians, commanded by General Reupel. He next crossed the Weser, and having reached Elsfleth, and taken possession of a sufficient number of vessels and seamen, he embarked his troops; and finally, after stopping at Heligoland, landed in England with his men 1809, Aug. He was received with enthusiasm; and having entered the English service with his mén, took part in the Peninsular war, where he served with distinction, receiving from the British government an allowance of £6,000 a year, which he retained till his return to his own dominions 1813. Although no prince could be more earnestly bent on securing the welfare of his subjects, his efforts failed utterly from the untimely and injudicious nature of the reforms he endeavored to effect; while the magnitude of his military establishments, which were quite unsuited to the limited extent of his territories, excited the ill-will of his people. He joined the allied army with his hussars after the return

of Napoleon from Elba, and fell while leading his men at Quatre Bras.

FREDERICTON, *frĕd'ĕr-ĭk-tŏn*, Canada: city and port of entry, capital of the province of New Brunswick and county-seat of York county.

Situation.—The city is built on a low point of land on the right bank of the St. John river, 56 m. n. w. of St. John, is nearly surrounded by hills and is well laid out, the principal streets running parallel to the river. The river is navigable to F., 84 m. from the Bay of Fundy, for large vessels, and for small vessels about 60 m. further. The Canadian Pacific and Canadian Eastern (now a branch of the Intercolonial) railways enter the city.

Public Buildings, Schools and Churches.—Among the public buildings of F. are the government house, the provincial building, court-house, city hall, custom house, barracks, jail, exhibition building, and the Victoria hospital. The educational institutions include the University of New Brunswick, the provincial normal school, and several libraries. Fredericton is the seat of an Anglican bishopric and contains numerous churches, chief of which is the Christ Church Cathedral (Anglican).

Manufactures.—The chief manufactures are lumber and timber products, woolen goods, leather, boots and shoes, iron castings, machinery, etc.

History and Population.—The city was founded about 1740 and was first called Saint Anne, but after New Brunswick had come into possession of the British, Sir Guy Carleton, the gov. gen., in 1785 changed the name to Fredericton and two years later made it the capital of the province. Fredericton received its city charter in 1849. Pop. (1901) 7,117; (1908) about 8,000.

FREDERIKSHALD, *frĕd'ėr-ĭks-hâld:* fortified seaport of Norway, dpt. (amt) of Smalenen, on an inlet called Swinesund, near the Swedish border, about 60 m. s.s.e. of Christiania. It is beautifully situated, and is a neat, well-built town, with several handsome edifices. Its harbor is excellent, accommodating the largest vessels. S.e. of the town stands the fortress of Frederiksteen, on a perpendicular rock 400 ft. high; often assaulted, but never yet taken. While laying siege to Fredericksteen, Charles XII. of Sweden was killed, 1718; in commemoration of which event an obelisk was raised 1814 on the spot where he fell. Pop. 12,000.

FREDERIKSTAD: *frĕd'ėr-ĭk-stâd:* fortified seaport of Norway, prov. of Christiania, at the mouth of the Glommen river; 48 m. s.e. of Christiania city. It has a commodious and safe harbor, large shipping trade, and manufactories of pottery, hardware, agricultural implements, tiles, and brandy. It was founded by Frederick the Great 1657, was strongly fortified, and was besieged in vain by Charles XII. of Sweden 1716. Pop. 14,500.

FREDRO, *frā'drō*, Count Alexander, Polish dramatist, called 'the Molière of Poland': b. Suchorow, Galicia.

1793; d. Lemberg 1876, July 15. He was the founder of Polish comedy, those who preceded him having only adapted French plays. *Mr. Moneybags* (his first piece, 1821); *Ladies and Hussars; Man and Wife;* and *Revenge,* are the titles of his chief plays.

FREE, a. *frē* [AS. *freo;* Icel. *fri;* Goth. *frija,* free—*lit.,* acting at pleasure]: being at liberty; not under restraint; enjoying civil rights; allowed or permitted; not encumbered; open; unreserved; exempt from; liberal; gratuitous; licentious; in *OE.,* ready; eager: V. to set at liberty; to rescue; to release; to remove obstruction or encumbrance from; to clear from. FREE'ING, imp. FREED, pp. delivered from restraint; cleared. FREE'LY, ad. *-lĭ,* in a free manner; liberally; generously; without necessity. FREE'NESS, n. state of being unconstrained; frankness; openness. FREE-AGENCY, the state of acting freely or without necessity. FREE-AGENT, one under no constraint of will. FREE BANKING, the predecessor of and essentially the same as our present national banking system, and on the same principles as the general railroad and corporation laws. Up to 1838 all banks required special charters, with the attendant evils of collusive 'blanket' powers, corruption, and an insecurity which was not only a private evil, but seriously affected the state credit and finance. In that year New York State passed a 'free' or open banking law, under which anyone could start a bank by depositing with the State an amount of securities equal to its circulating notes. The other States soon followed the precedent. FREE'BOOTER, *-bôt-ėr* [*free,* and *booty:* OE. *freebutter:* Ger. *freibeuter*]: a robber; one who roves about for plunder or booty; one who without actual national war appropriates as booty whatever he can lay his hands on in any country; a name especially applied to the buccaneers infesting the coasts of America in the 16th and 17th c., corrupted by the freebooter into *flibustiers,* and by Sp. into *filibusters,* which latter is the term for 'American piratical adventurers,' whose field of operations was principally the W. Indies, and Central and S. America. FREE'BOOTING, plundering, pillaging. FREE-BORN, a. free by birth; inheriting liberty. FREED'MAN, n. a slave set at liberty by law. FREE'DOM, n. *-dŭm* [AS. *freodom*]: liberty; independence; particular privilege; ease of doing anything; familiarity. FREEHEARTED, a. open; frank; liberal; generous. FREE'HOLD, property which a man holds for life or in his own right; fee-simple. FREE'HOLDER, one who possesses a freehold. FREE-LANCES, roving companies of knights and soldiers, after the Crusades, who wandered from state to state, selling their services to any lord who could pay for their aid in the perpetual feuds of the middle ages: known in Italy as Condottïeri. FREE'MAN, one who possesses liberty, or particular privileges. FREEMA'SON, *-mā'sn, formerly,* one of an ancient fraternity of operative masons; *now,* a member of a secret society professedly and in intention founded on moral virtue, but usually a mere social and benevolent association. FREE'MA'SONRY, n. *-mă'sn-rĭ,*

the principles of the society of freemasons. FREE-MINDED, free from care. FREE-SCHOOL, a school free from the payment of fees; a school open to all. FREE-SPOKEN, speaking without reserve or restraint. FREESTONE, variety of sandstone easily cut or wrought. FREE AND EASY, making one's self at home; without formality. TO MAKE FREE, to take undue liberties. FREEHAND DRAWING, ordinary drawing and sketching, as distinguished from mechanical and geometrical drawing with instruments. —SYN. of 'free, a.': permitted; allowed; unrestrained; ingenuous; frank; generous; clear; guiltless; innocent; exempt; enfranchised; ready; eager; independent; voluntary; spontaneous; willing; abundant;—of 'free, v.': to loose; liberate; banish; frank.

FREE'BENCH (*Francus Bancus*): in the ancient legal custom of certain manors in England, a widow's right of dower out of the lands held by her husband in Socage (q.v.): see also DOWER. A widow who has forfeited her freebench is, by the custom of some manors, permitted to recover her right.

FREE CHURCH: the term applied by British nonconformists to the Christian denominations throughout the British empire, free from state patronage and control. The Free Church of England is a distinct evangelical Protestant denomination founded on the basis of recognizing only two orders, presbyters and deacons, although the first order also comprises bishops, maintains the ecclesiastical parity of presbyters, whether episcopally or otherwise ordained. The governing body is the convocation consisting of all the clergy and laity in the several churches. The denomination originated in the creation of 'free churches' in the west of England, as a protest against the Tractarian movement of 1832. The Shore controversy (1843–9), and the Gorham case (1849–50), promoted its development. It was enrolled in chancery by a deed poll in 1863. The bishops are in the Canterbury line of episcopal succession. The Free Church Association founded in 1866, in English ecclesiology, is a society which has for its main object the abolishment in the Established Church of pew rents and pew ownership, maintaining the equal right of all parishioners to the free use of seats in churches. It has a long list of distinguished patrons, and aids churches with pecuniary grants if 'free' and in need.

FREE CHURCH OF SCOT'LAND: a Presbyterian organization of those who at the 'Disruption' of the Established Church of Scotland, 1843, withdrew from connection with the state, and formed themselves into a distinct religious community, at the same time claiming to represent the historic church of Scotland, as maintaining the principles for which it has contended since the Reformation.

There is no difference between the Free Church of Scotland and the Established Church in the standards which they receive and all the laws of the church existing and in

force prior to the Disruption, are acknowledged as still binding in the one as much as in the other, except so far as they may since have been repealed. The same Presbyterian constitution subsists in both churches, with the same classes of office-bearers and gradations of church-courts. The Free Church, indeed, professes to maintain this constitution and church government in a perfection impossible in the present circumstances of the Established Church, because of acts of parliament by which the Established Church is trammelled, and interventions of civil authority to which it is liable. And the whole difference between the Free Church and the Established Church relates to the consent and submission of the Established Church to this control of the civil power in things which the Free Church regards as belonging not to the province of civil government, but to the church of Christ and to its office-bearers and courts as deriving authority from Him; so that the controversy is often described as respecting the *Headship of Christ* or the *Kingdom of Christ*, though in terms this doctrine is fully professed by both churches. Those who constituted the Free Church of Scotland in 1843, firmly believed that the church might be connected with the state, and receive countenance and support from it, to the advantage of both; while they maintained that there must not, for the sake of any apparent benefits flowing from such connection, be any sacrifice of the independence or self-government of the church, as the kingdom of Christ, deriving its existence, organization, and laws from Him. Nor has any change of opinion on this subject been manifested.

The Westminster Confession of Faith asserts 'that there is no other head of the church but the Lord Jesus Christ;' and that 'the Lord Jesus, as King and Head of His church, hath therein appointed a government in the hand of church-officers, distinct from the civil magistrate;' it ascribes to these church-officers the right of meeting in 'synods or councils,' which it affirms to be 'an ordinance of God;' and represents the exercise of church-discipline as intrusted to them as well as the ministry of the word and sacraments. It ascribes to the civil magistrate much power and many duties concerning things spiritual, but no power in or over these things themselves. And all this was equally the doctrine of the Church of Scotland before the Westminster Confession was compiled. The support which, in many parts of Europe, princes gave to the cause of the Reformation, and the circumstance that states as well as churches were shaking off the fetters of Rome, led in many cases to a confounding of the civil and the spiritual. The Church of Scotland accomplished its emancipation from Rome, not with the co-operation of the civil power, but in spite of its resistance; and after the Reformation, the Scottish Reformers and their successors were compelled to a closer study of their principles, by the continued attempts of the civil rulers to assume authority over all the internal affairs of the church. But amid their struggles,

the Presbyterians of Scotland so far prevailed as to obtain at different times important acts of parliament in recognition of their principles, and 'ratification of the liberty of the true kirk;' and finally, after the Revolution of 1688, an act ratifying the Westminster Confession of Faith itself, and incorporating with the statute law of the realm all its statements concerning the province of church-judicatories and that of the civil magistrate, and the bounds of their respective powers.

The rights and privileges of the Presb. Church of Scotland, guaranteed by the Revolution settlement, were expressly secured by the Treaty of Union, and jealously reserved from the power of the British parliament; yet within five years afterward when Jacobite counsels prevailed in the court of Queen Anne, an act was passed for the restoration of patronage in Scotland, with the design of advancing the Jacobite interest by rendering ministers more dependent on the aristocracy, and less strenuous advocates of the most liberal principles then known. This act soon became the cause of strife within the Church of Scotland, and of separation from it; effects which have continually increased to the present day. That the church at first earnestly protested against the act; that this protest gradually became formal, and was at last relinquished; that the church-courts themselves became most active in carrying out the settlement of presentees, notwithstanding all opposition of congregations—these are points to which it is enough here to allude. It is important, however, to observe that in all the enforcement of the rights given to patrons by the act of 1712, during the 18th c., and considerable part of the 19th, no direct invasion of the ecclesiastical province took place on the part of civil courts or of the civil power; the presentation by the patron was regarded as conveying a civil right at most to the benefice or emoluments only, while the church-courts proceeded without restraint in the induction of ministers, and a few instances it happened that the benefice and the pastoral office were disconnected by the opposite decisions of the civil and ecclesiastical courts. And even the 'forced settlements,' in which the fullest effect was given by the church-courts to the will of patrons, were accomplished according to the ancient form, upon the *call* of the parishioners, inviting the presentee to be their minister, although the *call* was a mere form—in the words of Dr. Chalmers, 'the expressed consent of a few, and these often the mere driblet of a parish.'

When the 'Moderate' party, long dominant in the general assembly of the Church of Scotland, became again the minority 1834, the accession of the 'Evangelical' party to power was at once signalized by an attempt to restore the *call* to efficacy. This was done by the famous *Veto Law*, by which it was declared 'that it is a fundamental law of this church that no pastor shall be intruded on any congregation contrary to 'the will of the people'; and enacted, in order to give effect to this principle, that a

solemn dissent of a majority of male heads of families, members of the vacant congregation, and in full communion with the church, shall be deemed sufficient ground for the rejection of the presentee. The Veto Law thus determined rather how strong an expression of dissent by the parishioners should be requisite to invalidate a call, than how strong an expression of assent should be requisite to give it validity; a point afterward turned to account in controversy; as if the *veto* were a new and unconstitutional principle introduced; though it was certainly adopted as the least extreme mode of giving effect to the old principle which the law declared.

The same general assembly by which the Veto Act was passed, is memorable for the assertion of the constitutional principles and inherent powers of the church in another important particular, the admission of the ministers of 'chapels of ease' to the same ecclesiastical status with the ministers of endowed parishes, in consequence of which they became members of church-courts, and had districts assigned to them *quoad sacra,* with the full parochial organization.

The Veto Act was soon the subject of litigation in the court of session. A conflict arose which in various forms agitated the whole of Scotland, and which, erelong, related as much to the status of chapel ministers as to the rights of presentees to parishes; and indeed involved the whole question of the relations of civil and ecclesiastical powers, at least as far as the Established Church was concerned. The first case carried into the civil court was that of a presentation to Auchterarder, in which the call to the presentee was signed by only two parishioners, while almost all who were entitled to do so according to the Veto Act, came forward to declare their dissent. The decision of the court of session, which, upon an appeal, was affirmed by the House of Lords, was to the effect, that the rejection of the presentee on the ground of this dissent was illegal; the opinions of the judges in the Scottish court were indeed divided; but those in accordance with which the judgment was pronounced, asserted the right of the civil courts to review and control all proceedings of church-courts, a power whose exercise was speedily attempted in other cases, to the extent of requiring presbyteries to proceed to the settlement of qualified presentees without respect to the opposition of congregations; interdicting the admission of ministers to pastoral charges even when no question of emoluments was involved; interdicting the *quoad sacra* division of parishes or any innovation on the existing state of a parish as to pastoral superintendence and the jurisdiction and discipline of the kirk-session; interdicting church-courts from pronouncing ecclesiastical censures, and suspending or revoking them when pronounced; interdicting ministers from preaching the gospel and from administering the sacraments within certain parishes; determining who should and who should not be deemed entitled to sit and vote in general assemblies and other courts of the

church; and other such measures, wholly subversive of the independence of the church, and reducing it, if acquiesced in, to the condition of 'a creature of the state.' They were not, however, acquiesced in; and though in one instance ministers were brought to the bar of the court of session, and reproved for disregarding its authority, their protest against its claim to authority was maintained even there; and in the far greater number of instances, its interdicts were broken without any attempt being made to call those who did so to account. It is impossible here to enter into the details of this struggle, which was brought to a final issued by the judgment of the House of Lords 1842, Aug., affirming a decree of the court of session, which required the presbytery of Auchterarder to take the ordinary steps toward the settlement of the presentee to Auchterarder, without regard to the dissent of the parishioners. The law of the land being thus decided by the supreme court to be such as they could not with good conscience comply with, and parliament having rejected an application, in the form of a 'Claim of Right,' for an act such as would have reconciled the duties of their position according to the law of the land, in the church by law established, with what they believed to be their duty toward Christ and according to his law; it now seemed to the greater number of the ministers and elders holding the principle of the independence of the church, that the only course open to them was to retire from their position by the sacrifice of the emoluments and benefits of an establishment. And this they did at the meeting of the general assembly 1843, May 18. . Headed by Dr. Chalmers, Dr. Welsh, and others of the most eminent in the church, they left the appointed place of meeting of the general assembly, St. Andrew's Church, Edinburgh, and proceeded to another place, previously prepared, Tanfield Hall, Canonmills, where, in the midst of a great concourse of people, the first general assembly of the Free Church of Scotland was immediately constituted, and Dr. Chalmers was unanimously called to the chair as its moderator. 474 ministers renounced their connection with the Establishment, and with them a great body of its elders and members.

Immediate steps were taken for completing the organization of the Free Church, and extending it as much as possible into every district of Scotland. The forethought of Dr. Chalmers had already devised the SUSTENTATION FUND (q.v.). The Free Church undertook from the first the continued support of all the missions previously carried on by the Church of Scotland; and all the missionaries hastened to declare their adherence to the Free Church. An 'education scheme' . was soon undertaken; and *colleges* for the training of ministers were founded in Edinburgh, Glasgow, and Aberdeen. Considerable opposition was at first shown by landowners, who refused to grant sites for churches and other buildings; but this gradually gave way. The bitterness of feeling which at first existed between the

Established Church of Scotland and the Free Church has long since very much passed away.

Since 1843, the history of the Free Church has been generally that of peaceful progress. It has been agitated by questions respecting the administration of the Sustentation Fund, colleges, etc., of little interest to those beyond its own pale. It was brought into a litigation in the court of session, seeming to affect its fundamental principles. The minister of the Free Church at Cardross, in Dumbartonshire, having been suspended by the general assembly of 1858, had recourse to the court of session, on the alleged ground of irregularity in the proceedings of the ecclesiastical judicatories, demanding the suspension of the sentence; and being on this account summarily deposed by the general assembly, he raised an action in the court of session, not only claiming damages, but to have the sentence rescinded and found null and void. The case terminated in a recognition of the independence of the church in things purely spiritual, and a full admission of its subjection to the civil courts in all things temporal, including the right of these courts to demand full information as to all ecclesiastical proceedings, and production of minutes and other documents, when they should see cause. Negotiations toward union with the United Presbyterian Church gave rise to great dissension in the Free Church, and it seemed as if its disruption was impending, but in 1900 the Free Church of Scotland and the United Presbyterian church of Scotland merged their interests and formed the United Free Church of Scotland. The new organization had 1,664 congregations; 1,795 ordained ministers; 495,259 members, besides 94,460 adherents; 2,364 Sunday schools, with 28,289 teachers and 334,228 scholars; and annual free-will offerings exceeding $5,000,000. The denominational courts are the general assembly, 11 synods and 64 presbyteries. Representatives of the Free Church of Scotland and the United Presbyterian churches met in Edinburgh 1900, Oct. 31, and constituted the United Free Church of Scotland. A small minority representing 26 congregations refused to enter the new organization, claiming to be the Free Church of Scotland, and brought suit for the property and endowments. The case was decided against them in the Scottish courts, and appealed to the House of Lords, where they were successful on the second hearing. They at once took legal action to secure their rights, but in Dec., 1904, a Royal Commission was appointed to enquire into the matter, and the report of this commission stated that 'the Free Church was unable to carry out all the trusts of the property.' In Aug., 1905, the Churches (Scotland) Act was passed providing for the apportionment of church property between the two by a commission of five.

FREED'MEN'S BU'REAU: organization created by act of congress 1865, Mar. 3, and attached to the war dept. 'for the supervision and management of abandoned lands and the control of all subjects relating to refugees and freed-

men from any district of the country within the territory embraced in the operations of the army.' Gen. Oliver O. Howard was appointed commissioner 1865, May 12, and was provided with a number of assistants either appointed or detailed from the army. The dist. assigned each asst. commissioner was sub-divided and placed under the control of sub-asst. commissioners, and in addition a supt. of education was appointed for each state within the jurisdiction of the bureau. To facilitate the large and complex work devolved on the bureau, adjutant's, quartermaster's, special commissary, land and claims, transportation, bounty, and school divisions were created, and each placed in charge of a competent officer. A supplementary bill, passed 1866, Feb. 6, was vetoed by Pres. Johnson as unconstitutional, and failed to pass over the veto. Another, passed 1866, July, continued the bureau two years, was vetoed and passed over veto. In 1868, June, the bureau was continued by law one year longer in unreconstructed states; 1868, Aug., it was provided that the bureau should be withdrawn from the various states 1869, Jan. 1, except as to its educational work, which did not stop till 1870, July 1; the collection of pay and bounties for colored soldiers and sailors was continued by the bureau till 1872, when its functions were assumed by the war department. The total expenditures of the Freedmen's Bureau 1865, Mar.—1870, Aug. 30, were $15,359,092.

FREE'HOLD, Estate of (*liberum tenementum*, frank tenement): any estate of inheritance, or for life, in real property, whether a corporeal or incorporeal hereditament. This, which accords with Chancellor Kent's definition, somewhat extends the usage in English law.—In England, by freehold property is meant all estates which owe no duty or service to any lord but the king. What are now known as estates of freehold were, under the feudal system, denominated frank tenements. They were held by the honorable tenure of Knight's Service (q.v.) and Free Socage (q.v.), and might have been held either of the crown or of a subject. But the statue of *Quia emptores* having abolished subinfeudation, all freehold estates, except those held of subjects since the time of Edward I., are now held of the crown. A freehold estate must be an estate in fee, in tail, or for life; all other estates in land, as estates for years, are called chattel interests (see also Copyhold). An estate of freehold could in general be created only by livery of sasine of Feoffment (q.v.). By the doctrine of the feudal law, no person who had an estate of less duration than for his own life or for the life or another man, was considered a freeholder; and none but a freeholder was considered to have possession of the land. A tenant for years, etc., was regarded as holding possession for the freeholder. By 8 Hen. VI. c. 7, the famous statute was passed which still in great measure regulates the county elections, and enacts that no freeholder shall vote whose freehold is not of the value of at least 40*s* a year. By 2 Will. IV. c. 45, s. 18, this qualification is con-

tinued as to all freeholds of inheritance, and to freeholders for life in actual occupation, or who have acquired their lands by marriage, marriage settlement, device, or promotion to any benefice or office.

Freehold estates are recognized in American law and the essential characteristics of the English Common Law, modified by changes of situation and place, continue, except in the matter of alienage. Under the English common law, aliens could purchase lands and hold them as against all the world except the state. They could be deprived of their lands by the state through a technical proceeding known as 'office found.' But aliens could not take lands by descent nor transmit them to others as their heirs. The disabilities of aliens in respect to the holding and transmission of estates, have under statutes, ranging in the different states, been very largely removed.

FREE'HOLD LAND SCHEME: a plan in Britain to enable mechanics, artisans, and other working persons, to purchase a piece of freehold land, of such yearly value as to entitle the owner to the elective franchise. Irrespective of any political object, benefit building societies now exist in most of the chief British towns: see BENEFIT SOCIETIES.

FREEMAN, EDWARD AUGUSTUS, D.C.L., LL.D.: 1823, Aug. 2—1892, Mar. 16; b. Harborne, Staffordshire, England: historian. He was elected a scholar of Trinity College, Oxford, 1841, fellow 1845, and honorary fellow 1880; was examiner in the School of Law and Modern History 1857–8 and 1863–4, and in the School of Modern History 1873; Rede lecturer at Cambridge 1872; and Regius prof. of modern history and fellow of Oriel College, Oxford, from 1884 till his death. He made a single attempt to enter political life, 1868, when he was defeated for parliament. He was created honorary D.C.L. by the Univ. of Oxford 1870, honorary LL.D. by the Univ. of Cambridge 1874 and by the Univ. of Edinburgh 1884, and honorary member of the Imperial Univ. of St. Petersburg 1877. Freeman was a member of numerous historical and learned societies throughout the world. He was a popular lecturer, but was most widely known for his voluminous writings on historical, political, and architectural subjects. By many critics his *History of the Norman Conquest* (5 vols., 1867–76) is considered his greatest work as well as one of the greatest monuments of British historical learning. His other works include *A History of Architecture* (1849); *History and Conquests of the Saracens* (1856); *Historical and Architectural Sketches*, chiefly Italian (1876); *The Ottoman Power in Europe* (1877); *Historical Geography of Europe* (2 vols. 1881); *The Reign of William Rufus, and the Accession of Henry* I. (2 vols. 1882); *Some Impressions of the United States, English Towns and Districts*, and *Lectures to American Audiences* (1883); *The English People in its Three Homes* (1884); *The Practical Bearings of General European History* (1884); *Methods of Historical Study* (1885);

Chief Periods of European History (1886); *Greater Greece and Greater Britain* and *George Washington* (1888); *The History of Sicily from the Earliest Times* (1891–2); and a fourth series of *Historical Essays* (1892). Freeman was the leader of what has been called the Teutonic school in English history.

FREE'MAN, James, D.D.: 1759, Apr. 22—1835, Nov. 14; b. Charlestown, Mass.: Unitarian minister. He graduated at Harvard College 1777, was a military prisoner in Quebec 1780–82, became lay-reader in King's Chapel, Boston, 1782, became a Unitarian, induced the Episc. soc. of the church to change its prayer-book to harmonize with his new theological ideas, and was consecrated pastor of the church by his people on the refusal of the Episc. bp. to officiate. He was the first minister in the United States to acknowledge himself a Unitarian, changed the first Episc. church in New England to the first Unitarian church in the country, and held his connection with it till death. He was a member of the first Boston school committee, member of the Acad. of Arts and Sciences, and a founder of the Mass. Hist. Society.

FREEMAN, James Edward, American artist: b. Nova Scotia 1808; d. Rome, Italy, 1884, Nov. 21. He was a pupil of the National Academy of Design, and was elected national academician in 1833. From 1836 his studio was in Rome. His works, largely portraits and genre subjects, are skilful in color and display attention to technical detail. They include: *Young Italy*; *Peasants on the Sands of the Sezchio*; *The Beggars.*

FREEMAN, James Midwinter, American Methodist clergyman: b. New York 1827, Jan. 29; d. 1900. He was educated at Wesleyan University, and ordained to the ministry of the Methodist Episcopal Church, of whose Sunday-school Union and Tract Society he became secretary and editor in 1872. He was the author of *Use of Illustration in Sunday-school Teaching* (1867); *Handbook of Bible Manners and Customs* (1874); *Short History of the English Bible* (1879).

FREEMAN, Mary Eleanor Wilkins, American novelist: b. Randolph, Mass., 1862. She was educated at Mount Holyoke Seminary and after some years spent in Brattleboro, Vt., returned in 1883 to Randolph, which remained her home till her marriage to Charles Freeman in January, 1902, when she removed to his home in Metuchen, N. J. She came first into notice about 1886 by her extremely faithful delineations of certain phases of New England life in her short stories contributed to the magazines. After some years she attempted more sustained work, and within the last ten years has published several novels, displaying the same characteristics as her short stories, as well as skill in the handling of plot, and dramatic vigor. Her work has steadily gained in popularity and has been greatly admired by English as well as American critics. A fondness for very short

sentences gives her work almost a staccato character at times, and it must be said that while the accuracy of her studies of New England village existence cannot be called into question, her insistence upon the bareness of the life to the exclusion, or almost entire subordination of its happier phases, conveys a not wholly correct impression of the life in its entirety. Her published works include: *The Adventures of Ann* (1886); *A Humble Romance and Other Stories* (1887); *A New England Nun, and Other Stories* (1891); *Young Lucretia* (1892); *Giles Corey, Yeoman*, a drama (1893); *Jane Field*, her first novel (1893); *Penbroke* (1894); *The Long Arm*, with J. E. Chamberlin (1895); *Jerome, a Poor Man*; *Silence and Other Stories*; *The People of Our Neighborhood*; *Understudies*; *Madelon*; *The Love of Parson Lord*; *Evelina's Garden*; *The Wind in the Rose-Bush*; a series of ghost stories (1903); etc.

FREEMAN, Nathaniel, American jurist: b. Dennis, Mass., 1741; d. 1827. In 1763 he became resident at Sandwich. He fought in the Revolution, and was brigadier-general of militia forces in 1781–91. In 1795–99 he was a member of the United States Congress, and he also sat in the Massachusetts legislature, and was for many years judge of the court of common pleas. He was also a medical practitioner, and an orator of some distinction.

FREE'MAN—FREED'MAN: in the most general acceptation—the first, one who has inherited the full privileges and immunities of citizenship: the second, one who has been delivered from bondage but usually is not placed in full social or even political equality with him who was freeborn; e.g. the emancipated slaves in the Southern States. Though the words are Teutonic, the distinction between them depends on the constitution of Roman society. The equivalent for freeman (*liber homo*), indeed, comprehended all classes not slaves; but the distinction here pointed out was preserved by the application of the term *ingenuus* to him who was born free (Gaius, i. 11), and of *libertinus* to him who, being born in servitude, was emancipated. For further development of this subject in classical antiquity (see Slavery; Citizen). As the organization of Roman society survived the convulsions of the middle ages to a far greater extent in the towns (see Municipality: Municipal Corporation) than in the landward districts, where the institutions of feudality almost entirely superseded it, it is in the borough and other municipal corporations of Britain and of continental Europe, that we still find *freemen*, or persons inheriting or acquiring by adoption, purchase, or apprenticeship, the rights of citizenship: see Freeman's Roll. But the idea of a freeman was not peculiar to the Roman or Romanized population of Europe; on the contrary, it belonged to the constitution of society in all the Indo-Germanic nations. Among those commonly known as Teutonic, it was generally based on the possession of some portion

of the soil. In Anglo-Saxon England, the freemen were divided into Ceorls (q.v.) and Eorls (q.v.), or Thanes (q.v.). See CITIZEN.

FREE'PORT: city, cap. of Stephenson co., Ill.; on the Pecatonica river; at crossing of the Illinois Central and the Western Union railroads, and w. terminus of a branch of the Chicago and Northwestern railroad; 35 m. n. of Dixon, 70 m. e.s.e. of Dubuque, 121 m. w. of Chicago. It contains Freeport Presbyterian College, a county court-house, and public library, and has several fine churches, high and graded schools, beet-sugar factory, several foundries, and iron-mills, woolen-mill, etc. Pop. (1900) 13,258; (1910) 17,567.

FREE PORT (Ital. *porto franco*): harbor where ships of all nations may enter on paying a moderate toll, and load and unload. Free ports form dépôts where goods are stored at first without paying duty; these goods may then be either re-shipped for export on paying a mere transit duty, or they may pay the usual full customs of the country, and be admitted for home consumption. Free ports thus facilitate transit trade, and form, as it were, a foreign district within a state. See WAREHOUSING SYSTEM.

FREE RELIGION: theory concerning religion, advocated by an assoc., organized Boston 1867, May 30, by a number of persons under the leadership and presidency of Octavius Brooks Forthingham, with a view to freeing religion from all sectarian limits, reconciling the various faiths, and applying the scientific method to the study of theology. Extreme liberty of opinion is permitted every member, and in the meetings of the assoc., any one may maintain such views as he believes nearest right and truth on whatever subject may be presented for discussion or study. The assoc. holds conventions, distributes many publications, and publishes its annual reports in the Boston *Index*. Its influence is strongly against evangelical Christianity; indeed it holds that no religious tenet can be held as established so as to be worthy of general belief—unless it be the tenet that there is no tenet. Associations similar, though less prominent and permanent, have been formed in other places.

FREE'-SOILERS. See POLITICAL PARTIES.

FREE'-SPIRIT, BRETHREN OF THE: fanatical sect of the middle ages, generally (though sometimes secretly) diffused over Italy, France, and Germany, between the 13th and 15th c. They took their name from the 'freedom of spirit' which they claimed, in virtue of the words of the apostle Paul (Rom. viii. 2, 14), maintaining that the true sons of God are exempt from subjection to the law. They appeared first in Alsace, early in the 13th c., and attracted notice by their singular attire and their fanatical proceedings, traversing the country in troops, accompanied by women, with whom, under the name of sisters, they lived in the greatest familiarity. Their doctrine was a species

of pantheistic mysticism, which they applied with fearless consistency to all the details of moral obligations. They held, according to Mosheim, who has collected the original authorities, 'that all things emanate from God, and will revert back into Him; that rational souls are part of the Divine Being; that the whole universe is God; that a man, by turning his thoughts inward, is united inexplicably with the First Cause, and becomes one with Him; and that those who are so immersed in the vortex of the Deity attain to perfect freedom, and are divested not only of the lusts, but even of the instincts, of nature.' From these principles, they inferred that the free man, thus absorbed in God, is himself God, and a son of God, in the same sense in which Christ is called the Son of God; and that, as such, he is raised above all laws, human and divine; to such a degree that, according to some of them, 'the god-like man cannot sin, do what he may; either because the soul, being elevated and blended with the divine nature, is no longer affected by the actions of the body, or because the emotions of the soul, after such union, become in reality the acts and operations of God himself, and therefore, though apparently criminal and contrary to the law, are really good and holy, because God is above all law!' These principles, incredible as they may appear, are extracted by Mosheim, partly from the books of the sect, partly from the decrees of Henry, Abp. of Cologne, by whom they were condemned. They drew down upon the sect the arm of the state as well as the censures of the church. No sect of the time suffered so much from the inquisition in the 14th c. They were regarded as offenders against public order and morality, as well as against the faith of the church: (see INQUISITION). After the first appearance of the sect in Alsace (1212), where its leader was a certain fanatic called Ortlieb (after whom the members are sometimes called Ortliebians), it spread into Thurgau and the Upper and Lower Rhein. During the latter part of that century, one of the leaders, named 'Meister Eckart,' had so large a following at Cologne, that the archbishop made his teachings the subject of a lengthened edict. The sect spread also in Swabia, where its members were confounded with the Beghards. In France, they were popularly known by the name 'Turlupins,' a word of uncertain etymology. They were in Bohemia in the beginning of the 15th c., and there is considerable similarity between their principles and those of the Adamites, who figure in Hussite history. From this date they are heard of no more. See Mosheim, Soames's ed. II. 582; also Gieseler's *Church History*, III. 467, IV. 226.

FREE'STONE: any rock which admits of being *freely* cut and dressed by the builder; in many places Freestone is synonymous with sandstone. It has been defined also as any rock which works equally freely in every direction, having no tendency to split in one direction more than another: in this sense, lime stone and even granite have been called freestones.

FREE'THINKERS: term applied to certain English deists who wrote chiefly in the early part of the 18th c. It was used to characterize Toland in 1697, and was accepted by Collins in his *Discourse of Free Thinking*, 1713; but soon became an opprobious designation, as the writers of this school denied some of the prevalent tenets as to revelation, atonement, etc. They had been preceded by Lord Herbert of Cherbury (1581–1648), Thomas Hobbes (1588–1679). Lord Shaftesbury (1621–1683), and others, against whom Charles Leslie (1645–1722) directed his *Short and Easy Method with the Deists*, 1694. The principal Freethinkers were Matthew Tindal (1657–1733), John Toland (1669–1722), Antony Collins (1676–1729), Thomas Chubb (1679–1747), and Thomas Woolston (1669–1732): to these may be added the more famous names of Lord Bolingbroke (1678–1751) and David Hume (1711–1776). These men were of widely varying conditions and attainments; each was responsible simply for his own declared opinions; they attempted no organization, and pretended to no agreement except as to the supremacy of reason in matters of religion. They were strong theists; only one of them appears to have been a materialist—William Coward, whose books were burned by the hangman 1704. Their writings, or some of them, excited much attention, and called forth a multitude of replies, of which the most celebrated are Warburton's *Divine Legation of Moses*, 1738, and Leland's *View of the Principal Deistical Writers*, 1754. The English Freethinkers aimed to write under the direction of pure common sense. Voltaire and the Encyclopedists, who paved the way for the French Revolution, had much more to do with passion and politics. The German biblical critics of Tübingen, etc., were cloistered students and metaphysicians. The technical and historical application of the term Freethinkers, and of its synonym Rationalists, in narrowing the meaning to a set of men who proclaimed certain distinctive tenets, departs widely from the original and natural signification of the words. Properly, a freethinker or rationalist is simply one who follows reason and exercises the right and duty of private judgment—which is the essential principle of Protestantism, as against submission of the intellect to church authority, whether vested in popes, councils, or wheresoever. The words indicate the means used, not the end attained. Principal Tulloch has shown that rationalism may be either Christian or infidel, and a freethinker is not necessarily an unbeliever. Independent thinking in the church is essential to intellectual life, without which spiritual life does not usually thrive. Yet the present popular use of language appears to commend free thought while condemning freethinkers. See INFIDELITY; DEISM; RATIONALISM; FREE RELIGION; also names of most of the writers mentioned above.

FREE'-TOWN [name of the same significance as the *Liberia* of American origin s. of it]: town, capital of Sierra Leone, British settlement on the w. coast of Africa. It is

on the left bank of the Sierra Leone river, about 5 m. from the sea; lat. 8° 29′ n., and long. 13° 9′ w. The town is pleasantly situated, and its wide streets are prettily ornamented with rows of orange, lime, banana, or cocoa-nut trees. The temperature is nearly uniform, varying in opposite seasons between the averages of 77°.6 F. and 80°.9. Toward the interior, Freetown is enclosed by the mountain-chain from which the colony is designated, a position to which the proverbial insalubrity of the climate is partly owing. Pop., exclusive of the authorities and the garrison, almost exclusively of liberated negroes (1901) 34,463.

FREE TRADE: exchange of commodities across national or state borders without governmental interference. In interstate application this is the general policy of the German Empire, of the Australian Commonwealth, and of the United States. The unrestricted commerce of a century between our states is often cited as the greatest example of absolute Free Trade in history. But in international application, absolute Free Trade is not the policy of any government, not the declared purpose of any political party; and while it is the ideal of some political economists, it is not supported as a practical policy by any other school than the followers of Henry George. In its application to international as distinguished from interstate commerce, the term Free Trade is commonly used in a restricted sense. It distinguishes the policy of imposing tariffs for necessary revenue only, from the policy of imposing tariffs for the purpose of checking foreign importations in the interest of domestic production. Those who advocate the latter policy are Protectionists (see TARIFF; PROTECTION); those who advocate the former are commonly called Free Traders, although they themselves reject the appellation.

The most notable example of Free Trade in the restricted sense is furnished by Great Britain. Until the culmination in 1846 of the Cobden-Bright anti-corn law agitation, the Protection system had prevailed in England for centuries; but this agitation for the abolition of tariffs on imported grain, the Gibraltar of the British protective system of that time, resulted in the adoption by England of the policy of restricted Free Trade, which has ever since prevailed in that country and is now for that reason often called 'British Free Trade.'

The foundation for a like policy by the United States had been laid in 1845 by the historic treasury report of Robert J. Walker, Secretary of the Treasury under President Polk. Until then, the people of this country had been subjected to varying forms and degrees of the protection principle from an early day. In the Colonial period they had been burdened with British protection. Under the Confederation, some of the states had applied the principle of protection to interstate commerce. In the latter respect, the policy of Free Trade was established by the Federal Constitution; but the Constitution left Congress a free hand respecting international commerce,

and Alexander Hamilton, in his report of 1790, on manufactures, the first of the great American state documents on national revenues and international trade, outlined and advocated a moderate policy of tariff for revenue with incidental protection. It was not, however, until the close of the War of 1812 that the protective policy firmly asserted itself. Instigated, as Free Traders assert, by special interests which had been favored by the protection incidentally afforded by the Embargo and the Non-intercourse Acts and the war, a strenuous demand arose for continuing protection by means of the tariff. Consequently protection for the sake of protection was introduced in the tariff act of 1816. The policy was slightly strengthened in 1818, and greatly so in 1824. It was further strengthened in 1828, but in such manner as to earn for the tariff act of that year the epithet of 'the tariff of abominations,' which in 1832 produced a reaction to the tariff rates of 1824. Under the pressure of the Nullification movement, a compromise tariff was adopted in 1833; but in 1842 the protection principle resumed full sway. It was in the face of these circumstances that Robert J. Walker made his treasury report of 1845. His recommendations brought on the adoption of a revenue tariff with incidental protection in 1846, and a Free Trade tariff in 1857. 'The period from 1846 to 1860,' says Prof. Sumner, 'was our period of comparative Free Trade.' But the Civil War of 1861–65, necessitating high tariffs for revenue, resulted in abrogating the Free Trade policy. Faint efforts at its restoration were afterwards made, notably by President Cleveland in his tariff message of 1887, and also through the Wilson bill of 1894 before its emasculation by the Senate. Up to the present time, however, the Free Trade policy is under an eclipse in American politics.

Although tariffs for revenue may be incidentally protective, and absolute free traders object to them for that reason and also because they easily breed protective tariffs, yet the argument for Free Trade in both the limited and the absolute sense is essentially the same. Its distinctive lines may be sufficiently classified as industrial, historical, and ethical.

According to the industrial argument, trading must be profitable to buyer and seller both, or they would not trade; it is therefore profitable both to importers (buyers) and to exporters (sellers), and consequently to the importing as well as to the exporting of nations, which are merely aggregations of individual transactions; and being thus mutally profitable in its nature, the freer trade is to both sides in fact, the more profitable will it be in fact to each. The converse theory has given rise to the notion that an excess of exports implies prosperity whereas an excess of imports implies adversity. An excessive export balance is consequently called an 'unfavorable balance of trade.' (See BALANCE OF TRADE). Free traders regard this notion as fallacious. As to theory, they argue that

the commercial world's exports and imports as a whole tend to an equilibrium, balances either way being due to defective book-keeping, or to varying valuations, or to such omissions from the statistics as personal expenditures of tourists or foreign investments, or payments on account of former investments of foreigners in the exporting country. As to actual experience, they point to the large and continuous import or so-called 'unfavorable' balances of England, from which they infer that it is excessive imports rather than excessive exports that augment national wealth. They add this query: How can a country any more than an individual be enriched by an excess of 'exports,' which means outgo, and impoverished by an excess of 'imports,' which means income? Whatever it may be that the people of a country buy abroad, and do not pay for out of profits on their foreign investments, they pay for with exports from home. This can be proved by the analysis of any class of transactions in international commerce. If we pay by bills of exchange for the goods that we import, these bills represent goods exported by us. Otherwise they would not be redeemed (see EXCHANGE). If we pay for goods in bullion, it is the same thing. Exportations of American gold and silver, like exportations of American grain and machinery, are in the last analysis exchanges of American labor-products for foreign labor-products—exchanges that would not be made unless they were considered by each party to each exchange to be for his own best interest. In countries like Great Britain, where gold and silver are not found, they are obtained by means of exchanges of British labor-products for the gold and silver products of the labor of countries where those metals are found. The question of wages is a burning question along the industrial line of the argument for Free Trade. It is objected that home producers in competition with producers in countries where wages are low, must either reduce home wages or abandon the home market to foreigners. The same fallacious argument applies and has been as plausibly used in opposition to labor-saving machinery; yet countries of best labor-saving machinery are countries of highest wages. Countries of low wages do not necessarily produce more cheaply than countries of high wages. The reason is that cost of production depends not upon the rate of wages paid, but upon the product of the labor for which they are paid. For illustration, a $4-a-day man who turns out a $10 product per day is cheaper than a $1 man who turns out a $2 product. Protection for the employer's product against foreign competition, does not increase wages; but by increasing the prices of commodities it does weaken the purchasing power of wages. On the other hand, say free traders, Free Trade cheapens commodities, thereby strengthening the purchasing power of wages and in effect increasing them.

The historical argument for Free Trade is to the effect that this policy, to the extent to which it has been tried,

has invariably produced improvement in industrial conditions. One of the early forms of British protection, followed still by some South American countries, was by obstructing exportation. The abolition of this practice by England proved beneficial to her home industries. Her abolition of the modern form of protection, obstructing importation, was also followed by a marked and continued increase of commercial prosperity. Other reforms contributed to this improvement, but all were in the direction of minimizing obstacles to trade. Of the United States it is argued that industrial depressions of about 1820 and the middle '30's were under protection regimes, as were those of the '70's and the '90's. That of 1857, in the Free Trade period, was a temporary financial panic and not a prolonged industrial depression. It should be observed that all the industrial crises were doubtless due to other and perhaps deeper causes than the tariff. To the extent, however, that they may be attributed to tariff causes at all, Protection and not Free Trade is held responsible by free traders.

The ethical argument for Free Trade rests upon the doctrine of natural rights. What a man earns being his own property, he has the natural ethical right to trade it with any other honest person upon their own freely agreed terms. Whether the other is on the same side of a national boundary line makes no ethical difference. If either government interferes with such a trade, it deprives one of its citizens of his right to his own property; and if the interference be for the purpose of promoting another citizen's business, the property of the one is confiscated for the benefit of the other. In other words, Free Trade is an assertion, and its antithesis a denial, of the essential principle of property rights.

Free Trade principles being commercial, they must be distinguished from the principle of governmental regulations for non-commercial reasons. If the purpose of import tariffs is only to raise revenue, and this is the only effect, then there is no violation of the Free Trade principle as commonly understood. So with tariffs for police purposes, such as prohibitive tariffs on the importation of opium or of spirituous liquors. The object and effect being to exclude certain importations because the commodities themselves are bad, the Free Trade principle as commonly understood is not violated; for the question so raised is one of public morals and not of political economy. But if the object or the effect of international tariffs be in any way or to any degree to check commercial competition, they contravene the principle of Free Trade.

Bibliography.—Consult further, Adam Smith's *Wealth of Nations*, the pioneer English work on Free Trade; also the works of John Stuart Mill, Macleod, Amasa Walker, Prof. Perry, Prof. Sumner and David A. Wells; also Bastiat's *Sophisms of Protection*, Grosvenor's *Does Protection Protect?* Pierce's *The Tariff and the Trusts*, Tausig's

The Tariff History of the United States, Strange's *Farmers' Tariff Manuel*, Tausig's *State Papers and Speeches on the Tariff* (comprising Hamilton's and Walker's historic treasury reports, Gallatin's free trade memorial, and Clay's and Webster's speeches of 1824), and Bowker's *President's Message of* 1887. For the Free Trade argument on wages, see David A. Wells's *Relation of the Tariff to Wages*, Schoenhoff's *Economy of High Wages* and Henry George's *Protection or Free Trade*. Consult the last of these three for the argument for absolute Free Trade both international and individual. For the anti-corn law agitation, consult Life of Cobden, Trumbull's *Free Trade Struggle in England* and Flower's *How England Averted a Revolution of Force*. For the argument against Free Trade see TARIFF PROTECTION.

FREE-WILL: designation of a doctrine in opposition to the doctrine of 'philosophical necessity.' The contest between these two views has been maintained in the fields both of theology and metaphysics. In philosophy the idea of a man being 'free' in his actions appears first in the writings of the ancient Stoics. Afterward in Philo Judæus, Alexandrian Platonist, at the commencement of the Christian era, the inquiry is propounded, 'whether it be not the case that the upright man is free, and the vicious man a slave.' This language was evidently meant to pay a compliment to virtue, and to affix a degrading stigma on vice, and is not to be too literally interpreted as a dictum of philosophy. In systematic theory, the doctrine of freedom as applied to the human will, was contended for first by Pelagius against Augustine's doctrines regarding the operation of divine grace; and in a later age was the subject of controversy between Arminians and Calvinists—the Calvinists (such as Jonathan Edwards) having often been classed as Necessitarians, or, at least declared by their opponents to hold opinions which could logically be pressed into Necessitarianism. It is certain, however, that the theory of a *physical* determinism of a man's will—favorite metaphysical speculation in the natural science of recent years—would have been refused with horror by Edwards and writers of his school, as denying moral responsibility, and the possibility of man's holiness or sin, and any ineradicable distinction between man and the brutes.

Although in this dispute there are certain points of vital difference between the opposing parties, yet the problem has been needlessly encumbered with the unsuitable phraseology that has accidentally invested it; also, by an often unconscious shifting of the issue from its main point. Free-will has been sometimes maintained or denied as though it involved an act free from constraint of reason—mere arbitrariness. The true idea of freedom or liberty for a being like man, has been left out; freedom *of* will has been changed to freedom *from* will. The opposite word 'necessity,' also has great am-

biguity; being applied sometimes to logical and mathematical implication, as when we say the whole is greater than its part; sometimes to the rigorous uniformity of physical laws, such as gravitation; sometimes to an evident and absolute inevitableness, like that of the old pagan *fate;* sometimes on the other hand, to a mere certainty of futurition, altogether different from a necessity; and sometimes to what is merely a high probability, as when we expect that a man of honorable and upright character will speak the truth on some given occasions: see NECESSITY.

The doctrine of free-will amounts to the simple assertion, based on an appeal to man's consciousness, that man has and knows that he has, a certain power to choose certain courses of action, especially in moral affairs, and to choose to yield to certain motives and to resist others. It is not at all necessary to the doctrine of free-will that every man shall be always conscious of his liberty, or be always in exercise of it, or never be able actually to lose it in any direction or degree or for any period.

FREE-WILL BAPTISTS. See BAPTISTS, FREE-WILL.

FREEZE, v. *frēz* [Icel. *frjosa*; Sw. *frysa*, to freeze: Dut. *vriesen*, to tremble with cold: Low Ger. *vresen*, to be cold: F. *frisson*, a shivering]: to congeal; to be congealed; to harden into ice; to chill; to shiver with cold; to become chilled with cold; to kill with cold. FREEZ'ING, imp.: N. the process or state of congealing. FROZE, pt. *frōz*, did freeze. FROZEN, pp. a. *frō'zĕn*, hardened into ice; congealed by cold. FREEZ'ABLE, a. *-ă-bl*, that may be frozen. FREEZING-POINT, the degree of cold at which water turns into ice, being 32° Fahr. (see THERMOMETER). FREEZING AND FUSING POINTS: see FUSING AND FREEZING POINTS.

FREEZ'ING MIXT'URES: substances used in producing artificial cold. When matter passes from the solid into the liquid state, heat in large quantity disappears, and ceases to effect the thermometer: see HEAT. The chemist avails himself of the fact that heat disappears during liquefaction, for procuring artificial cold. When a piece of ice having a temperature of 32° F. is placed in its own weight of water at 174°, we find, on testing the water with the thermometer after the ice has melted, that its temperature is 32°: the heat which the water contained having disappeared during the melting of the ice. As water in passing from the solid to the fluid state possesses the property of rendering latent a greater amount of heat than any other substance, it is, when in a solid form as ice or snow, or when combined with salts as water of crystallization, a powerful agent in producing artificial cold.

The substance employed in freezing mixtures should be finely powdered, rapidly mixed, and placed in vessels with little conducting power. The following are a few of the important formulæ for these mixtures: 1. A mixture of 2 parts of pounded ice or of fresh snow and 1 part of com-

mon salt, causes the thermometer to fall to –4°. 2. A mixture of 5 parts of commerical hydrochloric acid and 8 parts of powdered crystallized sulphate of soda, causes a reduction of temperature from 50° to 0°. 3. Equal parts of water of powdered crystallized nitrate of ammonia, and of powdered crystallized carbonate of soda, produce a cold of –7°. 4. A mixture of 3 parts of crystallized chloride of calcium, previously cooled to 32°, and 2 parts of snow, produces a cold of –50°, sufficient to freeze mercury. 5. By dissolving solid carbonic acid, or solid nitrous oxide gas, in sulphuric ether, temperatures of from –120° to –146° may be obtained, at which alcohol passes to the consistency of oil, and finally to that of melted wax. This is the most powerful freezing mixture known.—The freezing mixtures used by confectioners, and most convenient for ordinary experimental purposes, are the first and second of the above list. See ICE; REFRIGERATING MACHINES.

FREIBERG, *frī'bĕrch:* ancient city of Germany, centre of administration for the Saxon mines; on the n. slope of the Erzgebirge mountains, on the left bank of the Münzbach, not far from its confluence with the Mulde, 20 m. s. w. of Dresden. It owes its origin to its silver mines, discovered about 1190. It is still surrounded by old walls and towers, and contains many interesting buildings and institutions, of which the principal are the town-house, dating from 1410, and the cathedral (1484–1512), two stately Gothic edifices, and the Berg-Academie, or School of Mines, founded 1765, the most famous institution of the kind in Europe. At the Berg-Academie, instruction is given by professors in surveying, mining, the preparation of ores, geology, mineralogy, etc. It possesses lecture-rooms, a library, and mineralogical and geological; and has three separate laboratories, and an office for the sale of minerals. Humboldt, Werner, Jameson of Edinburgh, and many other eminent geologists and mineralogists, studied at this institution. There are, it is said, about 150 mines of silver, copper, lead, and cobalt around Freiberg. The manufactures consist principally of articles in imitation of gold and silver ware, of white-lead, gunpowder, iron and copper wares, etc. In the 17th c. Freiberg was a place of great wealth, and had a pop. of 40,000. The mines have of late greatly fallen off, owing either to the richest veins being exhausted, or to the shafts being driven so deep that the water cannot be drained off from them. Pop. (1900) 30,175.

FREIBURG, *frī'bûrg:* town of Germany, grand duchy of Baden, cap. of the circle of the Upper Rhine, seat of an archbishop; on the Dreisam, on the w. border of the Black Forest, 42 m. s.s.e. from Strasburg. It is an open, well-built town; the walls and ditches with which it was formerly surrounded, have been converted into promenades and vineyards. The Minster or Cathedral of Freiburg is one of the most beautiful and perfect specimens of Gothic architecture in Germany. It is cruciform, of red sand-

stone, was begun 1122, and not thoroughly completed till 1513. It has a tower 367 ft. high, remarkable for elegance and lightness. In one of its chapels, the University Chapel, there are, among other pictures, a Nativity and an Adoration by Holbein, the latter considered one of his most successful pictures. The University of Freiburg was founded 1456; in 1891 it had 101 professors and teachers, and 931 students. The Exchange (*Kaufhaus*) is a quaint Gothic structure of the 16th c. The chief manufactures are chicory, tobacco, paper, potash, etc. Pop. (1900) 61,504.

FREIBURG, or FRIBOURG: canton of Switzerland, bounded n. and e. by Bern, s. and w. by Vaud and the Lake of Neuchâtel; 642 sq. m. The surface of the country is hilly, the mountains in the s. of the canton forming a continuation of the Bernese Alps, and rising in the highest points above 7,000 ft. The principal rivers are the Saane or Sarine—which traverses almost the whole extent of the canton from its s. to its n. extremity—and the Broye. The country abounds in excellent meadows and rich pastures, on which are reared the strongest horses and the best breed of cattle in Switzerland; indeed, the great part of the wealth of the canton consists in cows, sheep, goats, and horses, of which in proportion to its area there are great numbers. Dairy husbandry, and especially cheese-making, is pursued with great success; 40,000 cwt. of cheese are said to be made yearly. There are considerable manufactures of straw-plait, leather, cherry brandy, and tobacco. Freiburg was received as a member of the Swiss confederation 1481, and a liberal constitution was established 1848. It sends six members to the national council. More than two-thirds of the people are French, the remainder Germans. The official language is French, but all laws and decrees for the whole canton are published in both French and German. Pop. (1900) 127,951.

FREIBURG, or FRIBOURG: town of Switzerland, cap. of the canton of Freiburg; on both banks of the Sarine, but chiefly on a hilly promontory formed by one of its windings, about 18 m. s.w. of Bern. Seen from some distance, the town has an imposing and picturesque appearance. Houses climb to the top and extend to the very edge of the precipice that overhangs the river, and in another portion of the town they form terraces, the roofs of one tier on a level with the pavement of another; while the whole is surrounded by a long rising and falling line of embattled walls, with watch-towers and gateways of ancient fortifications still in good condition. The banks of the Sarine are connected by four bridges, one a suspension-bridge, 906 ft. long, 23 ft. wide, and 175 ft. above the stream, one of the longest bridges of a single span in the world—about 300 ft. longer than the Menai Bridge. Another suspension-bridge spans the gorge of Gotteron, and is about 700 ft. long and 317 ft. above the valley beneath. The church of St. Nicholas, a fine Gothic structure, has an organ built by a native of Freiburg, which has 7,800 pipes, one of them

32 ft. long; it is considered the finest toned instrument in Europe. This church has also the highest spire and finest set of bells in Switzerland. The other principal buildings are the Cantonal School (previous to 1848 the Jesuits' College), the most conspicuous building of the town; and the Lyceum. The inhabitants of the upper portion of the town speak French; of the lower portion, German. Freiburg has few manufactures; the chief are woolens, hardware, leather, pottery, and tobacco. Pop. 16,000.

FREIESLEBENITE, n. *frī'ĕs-lā'bĕn-īt* [after Herr *Freiesleben*]: a valuable ore of silver, combined with antimony and lead, in the form of sulphides.

FREIGHT, n. *frāt* [Ger. *fracht*, the loading of a wagon or ship; *ferchen*, to despatch: Swiss, *ferken*, to forward goods (see FRAUGHT)]: the cargo or part of the cargo of a ship or freight car; the hire of ship or car; the charge or price for transporting goods by water or rail: V. to load with goods for transport by water or rail; to engage or hire for transport of goods. FREIGHT'ING, imp. loading or carrying. FREIGHT'ED, pp. loaded. FREIGHT'ER, n. one who. FREIGHT'AGE, n. *frāt'āj*, money paid for freight.

FREIGHT [word having the same origin as 'fare']: the hire of a ship, or part of a ship, for the transport of merchandize; also the merchandize so transported. The agreement for the service is termed a Charter-party (q.v.). The meaning of the word has recently been enlarged to denote merchandize conveyed by land; also the money paid for such conveyance. In the United States the railways are provided with freight-cars—known in England as goods-vans. See CARRIERS.

If a merchant freight a whole ship, but neglect to fill it, the captain is not at liberty to complete the cargo from other sources, without accounting to the merchant for any moneys received for such additional load. On the other hand, if the merchant covenant to freight a certain portion of a ship, he is bound to pay the sum agreed on for that portion, notwithstanding his goods may fail to occupy so much space. If, in the charter-party, a day be appointed for sailing, and either the merchant fail to have his goods ready for embarkation by the time fixed, or the vessel be unprepared to start—wind and weather permitting—the agreement may be declared void by the aggrieved party, who can also recover at law for any detriment caused to his property by the delay. The use of charter-parties has been traced back as far as the reign of Henry III.

This contract, generally in commercial language called freight, is commonly spoken of by Scottish legal writers as Affrightment, from the French *affrètement* (Bell's *Com.* p. 414); but throughout the whole commercial world, so far as the provisions of the contract are not made subject of positive stipulation either by Charter-party or Bill of Lading (q.v.), they will be held in accordance with the universal usage of trade, and of that particular branch of trade to which the hiring has reference.

It was formerly held that the payment of the wages of the crew was, with various exceptions, contingent on the earning of freight by the ship, in accordance with the maxim of Lord Stowell, that 'freight is the mother of wages.' But this rule has been abrogated in England, and wages may now be recovered either by seamen or apprentices, even though no freight has been earned by the vessel. The seaman has a right to cling to the last plank in satisfaction of his wages; but in cases of shipwreck, his claim for wages will be barred if it be proved that he did not exert himself to the utmost to save the ship, cargo, and stores. The onus of proof is properly laid on those who impugn the conduct of the seaman. The old rule is in some extent still adhered to in the United States, but it is not applied to the master, and it does not hold with reference to seamen if the freight has been lost by the fault either of the master or owner; e.g., if the ship has been seized for debt, or for having contraband goods on board.

FREILIGRATH, *frī'lĭch-rât*, FERDINAND: 1810, June 17—1876, Mar. 18; b. Detmold, principality of Lippe: brilliant lyric poet of Germany. He attended the high school in his native town till 1825, then entered a merchant's office, first at Soest, afterward at Amsterdam. Encouraged by the favorable reception of his poems, he abandoned mercantile pursuits, married, and removed to Darmstadt. In 1842, a pension was bestowed upon him by the king of Prussia, whereupon he removed to St. Goar, on the Rhine. This circumstance, and his poem *Aus Spanien*, deprived him of the sympathy of the liberal party, which, however, was restored to him twofold when 1844 he gave up his pension, and in his political poems attached himself to the democratic party. The publication of his *Glaubensbekenntniss* (Confession of Faith), in the same year compelled him to take refuge abroad. He went to Belgium, Switzerland, and 1846 to London, where he resumed his mercantile pursuits, and became correspondent for the banking-house of Huth & Co. He was about to accept an invitation to America, sent him by Longfellow, when the events of 1848 recalled him to his native country. Freiligrath settled in Düsseldorf, where he became the most important member of the democratic party, and sang the praises of democratic socialism. He was impeached on account of his poem *Die Todten an die Lebenden* (The Dead to the Living). The interest felt in this trial was extraordinary. Freiligrath was defended by celebrated advocates, who did not fail to ridicule the folly shown in prosecuting a man for writing poetry. The doctrine that the poet is a 'chartered libertine' in the expression of his sentiments, carried the day, and Freiligrath was acquitted, 1848, Oct. 3. The consequence was inevitable. His poem immediately became the rage; the first edition was sold in Düsseldorf within a few hours. A second prosecution induced Freiligrath again to withdraw from his native country, and 1849–68 he resided in London. In the latter year, he returned to Germany, and

made Stuttgart his home. Several songs, written by him there at the beginning of the Franco-German war, have had great popularity. Freiligrath's principal productions are his *Gedichte* (1838; 27th ed. 1871); *Ca Ira!* (1846); *Die Revolution* (1848); and *Neuere politische und sociale Gedichte* (1849). Complete editions of his works appeared at New York (6 vols. 1858–9), and at Stuttgart (6 vols. 1870; 2d. ed. 1871). Freiligrath's poems display lively imagination, fire and melody of rhythm, a richness of execution, and a picturesque originality of style, which often passes into eccentricity and merely 'spasmodic' force of expression. His translations from English poets are admirable. Freiligrath died at Cannstadt, near Stuttgart.

FREISCHÜTZ, *frī'shütz* (the free-shooter): in German legend, a hunter or marksman who, by entering into a compact with the devil, procures balls, six of which infallibly hit, however great the distance, while the seventh, or, according to some versions, one of the seven, belongs to the devil, who directs it at his pleasure. Legends of this nature were rife among the troopers of Germany of the 14th and 15th c., and during the Thirty Years' War. The story appeared in a poetic form first in 1810 in Apel's *Gespensterbuch* (Ghost-book, 1810–15), and F. Kind adapted the story (1843) to the opera composed by Weber 1821, which has made it known in all civilized countries.

FRÉJUS, *frā-zhüs'* (anc. *Forum Julii*): small town of France, dept. of Var, a mile inland from the embouchure of the Argens (anc. *Argenteus*) into the Mediterranean Sea, 15 m. s.e. of Draguignan. It was originally a colony from Marseille, and was afterward colonized anew by Julius Cæsar, and called Forum Julii. It has remains of ancient Roman walls, and of a Roman circus and viaduct. The ancient harbor, at one time the most important Gallic port, and in which Augustus posted the fleet of 300 galleys which had been captured from Antony at Actium, has become silted up. Here, or rather at the new harbor of St. Raphael, 1½ m. off, Napoleon landed on his return from Egypt 1799, and embarked for Elba 1814. Pop. 3,000.

FRELINGHUYSEN, *frē'lĭng-hī-zėn*, FREDERICK: 1753, April 13—1804, April 13; b. Somerset co., N. J.; lawyer. He graduated at Princeton College 1770, was admitted to the bar 1774, elected member of the N. J. provincial congress 1775, re-elected 1776, and chosen by the legislature representative in the continental congress 1778. He resigned the latter office 1779, served again in it 1782–3. He was in active service through the revolutionary war, rose to the rank of col., and after its close held several state and county offices till 1793, when he was elected U. S. senator. The next year he held a maj.gen's. command during the Penn. whiskey insurrection, and resigned the senatorship on account of bereavements, 1796.

FRE'LINGHUYSEN, FREDERICK THEODORE, LL.D.: 1817, Aug. 4—1885, May 20; b. Millstone N. J.: lawyer and statesman. He lost his father at an early age and

was adopted by his uncle, Theodore Frelinghuysen, whose Christian name he added to his own. He graduated at Rutgers College 1836, studied law in Newark with his uncle, was admitted to the bar 1839, and the same year succeeded to the practice of his uncle when the latter assumed the chancellorship of the Univ. of New York. He became city attor. 1849, city counsel 1850, attor.gen. of N. J. 1861, member of the Peace Congress 1861, was re-appointed attor.-gen. on expiration of his first term 1866, and in the same year was appointed U. S. senator as a republican to fill vacancy in a term ending 1869, Mar. 4. In 1870 he was appointed by Pres. Grant and promptly confirmed as U. S. minister to England, but declined the office, and 1871 was elected U. S. senator for a full term. At the expiration of this term he was succeeded by John R. McPherson, democrat. In 1881, Dec., he was appointed by President Arthur sec. of state, succeeding James G. Blaine, was immediately confirmed, and held the office till the close of the administration. While in the senate he was a member of the committees on the judiciary, finance, naval affairs, claims, railroads, agriculture, and foreign relations, and was acting chairman of the latter pending consideration of the Alabama claims by the joint high commission. He voted for the conviction of Pres. Johnson, was intrusted by Charles Sumner with his famous Civil Rights Bill and advocated it till it passed the senate, was a member of the joint committee that reported the Electoral Commission Bill, and was a member of the commission.

FRE'LINGHUYSEN, Theodore, ll.d.: 1787, Mar. 28 —1861, Apr. 12; b. Franklin, Somerset co., N. J.: lawyer and statesman. He graduated at Princeton College 1804, was admitted to the bar 1808, was attor.gen. of N. J. 1817–29, declined office of judge of the supreme court 1826, and was U. S. senator 1829–35. At the expiration of his term he resumed practice in Newark, was elected mayor 1837, 8, was chancellor of the Univ. of New York 1838–50, whig candidate for vice-pres. of the United States on the Clay ticket 1844, and pres. of Rutgers College, New Brunswick, N. J., from 1850 till death. He was a man of eminent piety, was known as 'the Christian Statesman' while U. S. senator, was an efficient promoter of religious and charitable organizations, and was pres. of the American Board of Foreign Missions, 16 years; president of the American Bible Soc. 1846–61; president of the American Tract Soc. 1842–48: vice-president of the American S. S. Union from 1826 till near the close of his life, and vice-president of the American Colonization Soc. many years.

FREMESCENCE, n. *frē-mĕs'ĕns* [L. *frĕmis'cens*, uttering a low continuous growling or roar]: a confused, low, suppressed, and threatening murmuring among a multitude, forming the incipient stage of a popular tumult.

FREMONT, Neb., a city and the county-seat of Dodge County, in the central eastern part of the State, on the

Fremont, E. & M. V., the Union P., and the Sioux C. & P. R.R.'s, 37 miles northwest of Omaha. The town was settled in 1857 and was incorporated in 1871; it has a telephone system, gas works, and a municipal water supply and electric lighting plant. It is an important market for horses, cattle, sheep, and swine, and has pork-packing establishments, flouring mills, and planing mills. The educational institutions include a normal school and a business college. Pop. (1900) 7,241; (1910) 8,718.

FREMONT, *frē-mont':* city, cap. of Sandusky co., O.: on Sandusky river; at junction of the Lake Shore and the Lake Erie and Louisville railroads; 30 m. s.e. of Toledo, 88 m. w. by s. of Cleveland. Fremont is at the head of navigation on Sandusky river and has a large trade in the products of the surrounding farming region and oil and natural gas fields, and of its flouring mills, lime kilns, iron foundries, machine shops, car, engine, boiler, sash, door, blinds, tub, barrel, carriages, and agricultural implement works. It has many fine buildings including churches, high and public schools, free library, and fine public parks—two presented to the city by Sardis Burchard, the other comprising old Fort Stephenson purchased by the city. Pop. (1900) 8,439; (1910) 9,939.

FRÉMONT, Jessie Benton: an American author, 1824–1902, Dec. 27; b. in Virginia; settled in Washington, D. C., 1838, and was educated in the Georgetown Seminary. She was the daughter of Thomas H. Benton, U. S. senator from Missouri, and the widow of Gen. John C. Frémont, whom she married in 1843. After her husband's death in 1890 she became a frequent contributor to magazines and newspapers. She was the author of *Story of the Guard: A Chronicle of the War;* a sketch of her father prefixed to her husband's memoirs; *Souvenirs of My Time;* and *The Will and the Way Stories.*

FRÉMONT', John Charles: 1813, Jan. 21—1890, July 13; b. Savannah, Ga.; explorer. He graduated at Charleston College 1830, taught mathematics privately and on the sloop-of-war *Natchez* 1830–35, was appointed prof. in the navy but declined, and became an asst. engineer in the U. S. topographical corps. He was engaged in exploring and surveying in N. C., Tenn., and Ga., 1836–38. and in the country between the Mo. river and the n. frontier 1838; was commissioned 2d. lieut. of topographical engineers 1838, July 7, and while preparing his report and maps of the n.w. region in Washington fell in love with Jessie Benton, daughter of Thomas H. Benton, U. S. senator from Mo.; and received orders to explore the Des Moines river section 1840. In 1841 he eloped with and married Miss Benton. In 1842 he took charge of an expedition to examine the Rocky Mountain region, explored South Pass and the Wind River Mountains, and Aug. 15 reached the summit (13,570 ft.) of Wind River Peak, since called Fremont Peak, which, so far as known, had never been trod by man. He spent four months on this trip, returned to Washington and prepared for congress 1842–3 a report that

elicited high praise in that body and among scientific men in the United States and Europe. In the following year he received instructions to explore the unknown region between the Rocky Mountains and the Pacific Ocean and to connect his exploration with the surveys of Capt. Wilkes, U.S.N., so as to secure an uninterrupted survey of that vast region. His party numbered 39 and left the town of Kansas May 29. After travelling more than 1,700 m. he reached the 'Inland Sea' (Salt Lake) Sept. 6, and Fort Vancouver, on the Columbia river, the appointed terminus of the journey Nov. 4. On Nov. 10 he started on his return journey, proposing a circuit to the s. and s.e. and an exploration of the great basin between the Rocky and the Sierra Nevada mountains. He reached the first waters of the basin which he concluded was an unknown body and named it Pyramid Lake 1843, Jan. 10, struck the valley of the Sacramento Feb. 6, encamped on the summit of the pass in the dividing ridge (2,000 ft. higher than South Pass) which Indians told him no man could cross Feb. 20, made the passage without a guide in 40 days amid great hardships, reached Capt. Sutter's fort on the Sacramento Mar. 6, resumed his journey Mar. 24, and arrived at St. Louis Aug. 6 with vast stores of geographical knowledge of the region traversed. In 1845 he started on his third expedition designed for the survey of Or. and Cal. He advanced westward to the pass of the Cascades, where the Columbia river traverses the n. extremity of the Sierra Nevada, explored that chain southward in the depth of winter, and descended to the valley of the San Joaquin. Early in 1846 he started alone for Monterey, cap. of Upper Cal., and when near the city was ordered by Mexican troops to quit the country immediately. He sought his men, erected a fort on the Summit of Hawk's Peak, and raised the first U. S. flag on the territory of Cal. Soon afterward be continued his journey up the Sacramento valley into Or., and there received a secret despatch from the sec. of war instructing him to watch the govt.'s interests in Cal. in view of pending trouble with Mexico. He returned to Cal. June, aroused the American settlers in the vicinity of San Francisco Bay, captured a Mexican fort, garrison, 9 cannon, and 250 muskets at Sonoma Pass June 15, advanced to Sonoma, defeated the Mexican Gen. De Castro July 5, and was elected gov. of the province by the American Californians, who declared themselves independent of Mexico a few days afterward. He joined Com. Sloat, U.S.N., who had bombarded and captured Monterey, July 7, and on the arrival of Com. Stockton, U.S.N., with orders to conquer Cal., was appointed military commander and civil gov. of the territory. He assisted in the capture of Los Angeles Aug. 17, and 1847, Jan. 13, concluded articles of capitulation with the Mexicans which gave Cal. to the United States. After these brilliant exploits, he was divined to be the victim of an unfortunate clashing of authority. Com. Stockton and Gen. Stephen W. Kearny had received identical orders to conquer Cal. On the

J. C. FREMONT.

arrival of the latter he issued instructions to Frémont who had coöperated with the former in the early movements. Frémont was gov. by election of American residents and Stockton's appointment, but Kearny claimed the office as ranking officer. Frémont was placed under arrest by Kearny, tried by court martial on Kearny's charges at Washington, and sentenced to be dismissed the service for mutiny, disobedience, and prejudicial conduct. President Polk remitted the sentence, but Frémont resigned his commission 1848, Feb. 19. In Oct. following he started on his fourth exploring expedition, fitted out at his own expense, for the purpose of surveying a route for a great road from the Mississippi river to San Francisco. He penetrated the previously unknown country of the Apaches, then at war with the United States, was lost in the snow while crossing the great Sierra, and was forced by losses in men and animals to return to Santa Fé. He promptly organized another party, discovered a safe and available route, and reached the Sacramento early in 1849. While surveying his Mariposa tract and searching for gold in it, he was appointed by President Taylor commissioner to run the boundary between the United States and Mexico, and while so employed was elected one of the U. S. senators from the new state of Cal. Dec. 21. He drew the short term and served till 1851, March 4. In 1852–3 in Europe he was cordially received by scientists and men of letters; and learning that congress had made an appropriation for the survey of several soutes from the Mississippi valley to the Pacific Ocean, he left Paris 1853, June, and in Aug. started on his fifth trans-continental expedition at his own expense. He discovered passes through the mountains on the line of latitude 38° and 39°, and, after living on horse-flesh 50 days and being without food of any kind two days, was rescued by Col. Babbit 1854, Feb. 8, and reached San Francisco May 1. In 1855 he removed to New York; 1856, June 17, received the presidential nomination of the first national republican convention, and a few days later, the nomination of the national American convention. He announced himself as opposed to the extension of slavery and in favor of free labor. In the election he received a popular vote of 1,341,000 and an electorial vote of 114, and was defeated by James Buchanan. In 1861 he was appointed maj.gen. in the regular army, purchased arms for the federal govt. in Europe, made his headquarters in St. Louis, July 26, fortified the city, and occupied Cairo. On being assigned to command the newly created western dept. he proposed plans for driving the Confederates from Mo., and the whole valley of the Miss., and for opening that river direct to New Orleans. He assumed the gov. of Mo., proclaimed martial law, suspended disloyal publications, and announced that he would liberate the slaves of all persons in arms against the federal govt. President Lincoln objected to the emancipation scheme and requested Frémont to withdraw it, and on his refusal

annulled it by an executive order. In 1861, Sept., he started in pursuit of the Confederate army under Stirling Price with a force of more than 20,000 men, including 5,000 cavalry, and 86 heavy guns. In the following month his force numbered 30,000, and Nov. 2, just as he had overtaken the enemy at Springfield, he was relieved of command. In 1862, March, he was recalled to duty and placed in command of the new mountain dist., which included parts of Va., Ky., and Tenn., and fought a number of engagements with the Confederates under Gen. Jackson whom he pursued 8 days. In June Frémont's corps was included in the new army of Virginia, to the command of which Gen. Pope was assigned, and Frémont, unwilling to serve under an officer whom he ranked, was relieved at his own request. These events closed his military career. In 1864 he received the presidential nomination of a convention of republicans at Cleveland, and accepted it. Shortly before the election he was persuaded to withdraw his candidacy in the interest of the republican party. Soon after the close of the war be became interested in a railroad project for uniting Norfolk with San Diego and San Francisco, and secured a grant of land from the Tex. legislature for the Memphis and El Paso branch. In disposing of the land-grant bonds in Paris his French agents asserted that the bonds were guaranteed by the federal govt., and this falsehood led to his being prosecuted by the French govt. for fraud 1873, and sentenced to fine and imprisonment in default of personal appearance. In 1878 he was appointed gov. of Arizona, and served till 1882, and 1890, Apr. 19, he was placed on the retired list as a maj.gen. of the army. He received a gold medal for his discoveries from the King of Prussia 1850, was voted the Founder's Medal of the Royal Geographical Soc. of London and elected honorary member of the Royal Geographical Soc. of Berlin, was nobly commended by Baron Humboldt, and became known in learned circles as 'The Pathfinder.' Besides the reports of his various exploring expeditions, which have been translated into nearly every European language, he published *Memoirs of My Life* (New York, 1886).

FRENCH, a. *frĕnsh*: pertaining to *France*: N. the language of France. FRENCH'MAN, n. a native of France. FRENCHIFY, v. *frĕnsh'ĭ-fī*, to infect with the manners of the French. FRENCH'IFYING, imp. FRENCH'IFIED, pp. *-fīd*. FRENCH BEANS: see KIDNEY BEANS. FRENCH CHALK, a variety of steatite or soapstone used for marking. FRENCH HORN, a musical wind instrument. FRENCH LEAVE, to take without asking permission—alluding to the conduct of French soldiers in time of war. FRENCH POLISH, a furniture varnish.

FRENCH, DANIEL CHESTER: sculptor: b. Exeter, N. H., 1850, June 9. He studied with William Rimmer in Boston and Thomas Ball in Florence, returned to the United States 1876, and resumed residence in Florence 1878. His works include *The Owl in Love* and *Dick*

Swiveller and the Marchioness (dog groups in plaster): *The Minute Man of Concord* (unveiled on the battle-ground, Concord, Mass., 1875); *The May Queen*; *Elsie Venner*; colossal in St. Louis custom house, *Peace and War*; *The Waking of Endymion*: and statue of Gov. Chase, of Mich., for the National Memorial Gallery, Old Capitol, Washington.

FRENCH, L. VIRGINIA (*née* SMITH): 1830–1881, Mar. 31; b. Eastern Shore, Md.: poet. She was educated at Washington Female Seminary, Penn., removed with a sister to Memphis, Tenn., and opened a private school 1848, began writing for newspapers and magazines under the name of 'L'Inconnue,' went to New Orleans and became associate editor of the *Southern Lady's Book*, fashion magazine, 1852; married J. H. French, of McMinnville, Tenn., 1853, and was afterward editor of the *Crusader*, in Atlanta. Ga. Her published works include *Wind-Whispers*, poems (New York, 1856); *Iztalilxo*, tragedy (1859); and *Legends of the South* (Atlanta 1867).

FRENCH, WILLIAM HENRY: 1815, Jan. 13—1881, May 20; b. Baltimore: soldier. He graduated at the U. S. Milit. Acad. 1837; served in the Seminole Indian war and on the Canadian border 1837–8; was aid-de-camp to Gen. Pierce in the Mexican war and took part in the siege of Vera Cruz, the battles of Churubusco and Contreras, and the capture of Mexico City; and was again in the Seminole war 1850–52. He was appointed brig. gen. of vols. 1861, Sep.; was in all the battles and engagements of the army of the Potomac during the Peninsular campaign; commanded a division at Antietam and Fredericksburg 1862; was promoted maj.gen. of vols. 1862, Oct.; and commanded the third army corps 1863, Nov.—1864, May, when he was mustered out of the vol. service. He commanded the 2d U. S. artill. on the Pacific coast 1865–72, became lieut. col. and commandant at Fort HcHenry, Baltimore, 1875, and was retired 1880, July.

FRENCH BERRIES, or AVIGNON BERRIES, or PERSIAN BERRIES, or YELLOW BERRIES (Fr. *Graines d' Avignon*): small berries, fruit of certain species of buckthorn (q.v.), principally of the yellow-berried buckthorn (*Rhamnus infectorius*), used by dyers in dyeing yellow. For this purpose, they are gathered unripe and dried; they yield a rich yellow color, but as it is fugitive, mineral dyes have largely taken their place. It is, however, still exported from the Levant and from the s. of France: that from the Levant is the best. The yellow-berried buckthorn is a very spreading procumbent shrub, with ovato-lanceolate smooth leaves growing naturally in rough rocky places in the countries near the Mediterranean. It is cultivated to some extent in the s. of France.

FRENCH BROAD RIVER: picturesque stream rising in the Blue Ridge Mountains, Henderson co., N. C., flowing n.w. through the Smoky Mountains and Buncombe and Madison cos.; thence into Hamblen co., Tenn., where it receives the Nolichuncky river, turns s.w. and joins the

Tenn. river 3 m. above Knoxville. It is navigable for steamboats to Danbridge, 30 m., and is about 250 m. long.

FRENCH CHALK, a variety of steatite or talc (q.v.) occurring in fine-granular or scaly masses of milky-white color and pearly lustre. It is extensively used by tailors as a crayon for marking cloth, also as an absorbent in removing grease spots.

FRENCH HON'EYSUCK'LE (*Hedysarum coronarium*): beautiful biennial plant of nat. ord. *Leguminosæ*, sub-ord. *Papilionaceæ*, with branching and spreading stems, pinnate leaves, scarlet or sometimes white flowers, and jointed pods, which have one seed in each articulation. It has fine foliage, and an elegant appearance, and is often seen in flower-gardens. It is a native of the s. of Europe, where it is extensively cultivated as food for cattle. It grows to a height of four or five ft., yields a large crop, and is very nutritous. It is used either green or dried as hay. It requires a rather warm climate for profitable cultivation. The genus *Hedysarum* contains many species, extensively diffused over the warmer parts of the world. A few are found in cold regions, as *H. fruticosum* in Siberia growing, in sandy soils, very useful in fixing them by its roots, and valuable as food for horses.

FRENCH LANGUAGE AND LITERATURE. *The French Language.* It appears that in the 4th and 5th c. of the Christian era, the whole of Gallia, from the Rhine to the Pyrenees, had adopted the language of the Roman conquerors, not the polished speech of the classic writers—the *sermo urbanus*—but the form of Latin that had become common to all the subjugated provinces of central Europe —*lingua Romana rustica.* Suetonius, Pliny, Juvenal, and Martial make frequent reference to the Latin in use in southern Gaul and Spain; and in the 4th c. we find that, under Emperor Theodosius, the Roman senate was addressed by an orator of Gaul in rude and uncultured transalpine Latin. At this period, and much later, Latin was employed in the provincial assemblies of Gaul; but in the 7th c., two other forms of speech had come into general use—a provincial dialect of the *lingua Romana*, and a form of German known as the *lingua Theotisca.* The latter which was probably a mingled jargon, used in common by the Frankish and Teutonic tribes, and consequently in vogue in the north and east, received a more definite development under Charlemagne, who caused a grammar of it to be prepared for the use of the schools which he had established, and in which it was taught jointly with Latin. The council of Tours (813) recommended the use both of the rustic Latin and Teutonic dialect; and in 842, in the compact made between the two brothers, Charles the Bald and Louis the German, the former swore in the *Romana rustica*, and the latter in the *Teutsche* language, which, although it had been generally spoken at the court of Charlemagne, had already given place in France to the Frankish form of Latin. This Gallo-Romanic idiom early branched off into the two characteristically different forms

of the *Provençal* or *Langue d'oc* of the south, and the *Langue d'oil* of the north. The comparative prosperity which the south of France enjoyed, first under the kings of Arles, and subsequently under the counts of Provence, its freedom from foreign aggression for several centuries, the genia climate, and the more thoroughly Romanized character of the people, led to the early development of the Provençal, and, by the lips of the troubadours, breathed forth a rich melody of song; which, after a time, was re-echoed in less harmonious tones by the *trouvères* of the north in their ruder tongue. The earlier productions of these two schools exhibit striking differences in diction, inflection, and construction; and while the troubadour sang of love, and dwelt on the beauties which a southern climate and a fruitful soil scattered broadcast over the face of nature around him, the northern *trouvère* invented a chivalrous mythology of his own, and ascribed to the heroes of Greece and Rome, and the brethren in arms of King Arthur and Charlemagne, the sentiments of his own times. The use of the northern French was considerably extended through its adoption by the Normans, who in time carried it under William the Conqueror to England, and, under the northern leaders of the Crusades, to the south and east. In the south, on the contrary, the cruel persecutions of the Albigenses, against which the troubadours inveighed aloud, checked the development of the Provençal language; for the songs of the troubadours were proscribed, and thus the use of the *langue d'oil* soon extended with the spread of northern power into the provinces of Provence and Languedoc. The most important work written in French in the Middle Ages is the *Chanson de Roland*, a noble epic of the second half of the 11th c. The *Roman de la Rose*, an allegorical poem, begun in the 13th c. by Jean de Meung, and completed in the 14th c. by G. de Lorris, and l'Avocat Patelin, a witty and interesting farce, of the 15th c., are also important works. Froissart's chronicles of the 14th c., which afford a vivid picture of the wars of the English and French, in which he himself was active, are written in a language quite comprehensible to the modern student. Comines, 15th c., is a less picturesque narrator; but he may be classed among the earliest true historians of his country, for he was one of the first who observed public events with judgment, and recorded what he had seen in a straightforward, truthful manner. Francis I., by his love of music, song, and dramatic representations, gave encouragement to literature, while the French language acquired force and terseness through the writings of Clément Mavot, Rabelais, Ronsard, Amyot, and Montaigne. The language and literary talent of the nation underwent a process of development in the 16th c. which was completed by the establishment under the auspices of Richelieu, of the *Académie Française* 1635. At this period, Corneille brought French tragedy to its highest point of grandeur in the classic style of the drama, which he had adopted. His best pieces are *Le Cid*, *Horace*

Cinna, *Polyeucte*, Pascal, in his *Lettres Provinciales*, established a standard of French prose; while Descartes, in his *Discours sur la Méthode*, showed the adaptability of the language to subjects requiring conciseness and precision. A long galaxy of great names gave splendor to the reign of Louis XIV. in every branch of literature, and no age produced more vigorous writers or original thinkers. Bossuet and Flechier won renown by their noble funeral orations; Bourdaloue and Massillon, by their eloquent preaching; Fénelon, by his learning and earnest exhortations; and Pascal, by his Christian view of the great questions of human experiences. In dramatic literature, Racine and Molière stand forth conspicuous among a host of lesser writers, the former pre-eminent in tragedy, as his *Andromaque*, *Iphigénie*, *Phèdre*, *Athalie* testify; the latter inimitable in comedy, and exhibiting powers of delineating human character from a humorous point of view, that have never been surpassed. Among his best pieces are *Tartuje*, *Le Misanthrope*, and *Les Femmes Savantes*. La Fontaine is well known among his countrymen for his admirable Fables. La Rochefoucauld and La Bruyère, in their *Maximes* and *Caractères*, depicted human character, with its peculiarities, inclinations, and foibles in strong, humorous, and vivid touches. This was the age of Memoirs and Letters: in the former branch of contemporary history, Cardinal Retz and Saint-Simon were the most successful of the host of writers who gained reputation in this special department; while Madame de Sévigné's letters are models of easy epistolary style, and afford a lively picture of the times. This age, in which, at any rate, the *semblance* of religion had been respected, was followed by one of skepticism, infidelity, and philosophical speculations of the wildest kind. Three men of genius, Montesquieu, Voltaire, and Rousseau, contributed largely by their writings, and the influence which they exerted on their contemporaries, in bringing about the Revolution. Montesquieu, by his philosophical dissertations on the laws and government of his country, taught the French to take more enlightened views of the rights and duties of different classes of society, and thus naturally roused the angry passions of the oppressed lower orders; while the passionate eloquence of Rousseau won a hearing for doctrines relating to the rights of man and of the citizen. Voltaire's versatility of powers, exercised with equal ease and nearly equal success, on tragedy, satire, romance, poetry, history, and philosophy, enabled him, to the end of his long life, to maintain the supremacy over public opinion, which he had won in his youth. Ragnard, LeSage, Marvaux, and Beaumarchais wrote charming comedies; LeSage produced his immortal novel, *Gil Blas*, l'Abbe Prevost, his popular story *Manon Lascaut*, and Bernandin de Saint Pierre that graceful idyl, *Paul et Virginie*. Buffon devoted himself to the study and description of nature, and his *Histoire Naturelle*, which inaugurated a new era

in the literature of natural history, is a remarkable monument of the science and learning of that period. Diderot, and D'Alembert the geometer, founded the *Encyclopédie*, which, while it gave a lucid summary of numerous branches of human knowledge, was always hostile to religion. The Revolution, which had been materially accelerated, if not produced, by the inspirations of men of consummate intellect, was not favorable to literature. A period of almost complete intellectual torpor succeeded the active mental development that had characterized the preceding classic and philosophic periods. The Empire was scarcely more propitious of learning; but with the *Corinne* and *L'Allemagne* of Madame de Staël, and *Le Génie du Christianisme* and *Les Martyrs* of Chateaubriand, a reaction took place; and these productions were soon followed by numerous others, either belonging to the romantic school, or to the rival classical school. Among the host of writers who now acquired reputation, were in poetry, dramatic art, and fiction, Lamartine, Victor Hugo, and Alfred de Vigny. We may also mention A. Dumas, the elder, one of the most prolific of novel-writers, among whose most popular works are—*Les Trois Mousquetaires, Le Comte de Monte Christo, Le Collier de la Reine*, etc. Casimir Delavigne attempted to combine the romantic and classical schools in his *Louis XI., Les Enfants d'Edouard*, etc. George Sand (Madame Dudevant was one of the most elegant writers of her country. Her *Indiana*, which appeared 1832, inauguarated a new era of emotional novel writing, and has had numerous imitators. Among her numerous works, the most popular are *Lelia, Mauprat, Consuelo, La Mare au Diable, François le Champi, Marquis de Villemer, etc. Les Mysteres de Paris*, and *Le Juif Errant*, which depict the concealed miseries and depravities of social life, quickly brought their author, Eugène Sue, into notice. Among other writers of fiction are the great novelist, Gustave Flaubert, with faultless style; Balzac; Alfred de Musset, with his unrivalled richness of fancy, and melody of speech; Jules Sandeau; Merimée; Théophile Gautier; the literary partners, Erchmann-Chatrian; Edmond About; Dumas the younger, who later wrote mainly for the theatre; Alphonse Daudet; Guy de Maupassant, Paul Bourget, Pierre Loti, Rene Bazin, Anatole France, Marcel Prévost, and Paul Hervieu. Among the successful dramatists are Sardou, Augier, A. Dumas fils, Hervieu, Henri Lavendan, Maurice, Dauvey and Edmund Rostand, whose *Cyrano de Bergerac* (1897) and *l'Aiglon* were received with great enthusiasm. Among critics and essayists are Sainte Beuve, Prevost Paradol, Scherer, Edgar Quinet, Petit de Julleville, Brunetiere, Faguet, Doumic, and Jules Lemaitre. Among the poets, besides Lamartine, Hugo, and Vigny are Musset, Théophile, Gautier, Verlaine, Lacoute de Lisle, Sully-Prudhomme, François Coppée, and Henri de Rignien. Among historians Guizot has shown indefatigable research and a philosophic power of generalization in a great number of works, among which

the first rank may be awarded to his *Essais sur l'Histoire de France*, and *L'Histoire de la Civilisation en Europe*. Thierry, in his *Letters sur l'Histoire de France*, and *L'Histoire de la Conquête de l'Angleterre par les Normans*, shows great powers of narration and aptitude for theoretic criticism, perhaps more imaginative than sagacious. Thiers applied his learning, industry, and powers of delineation to the exposition of the revolutionary and imperial phases of French government. Lamartine, who carries his poetic inspirations and enthusiastic temperament into his historical researches, presents magnificent but not perfectly trustworthy pictures of history in his *Histoire des Girondins*. Michelet is known as the brilliant author of the *Histoire de France*, and Taine for his studies in the history of the Ancient Regime. Among the later historians are Albert Sosel, Henri Houssaye, Gabriel Hanotaux, Albert Vandal, and Pierre de la Gorce.

There is no department of the moral and physical sciences that has not been enriched and elucidated by the labors of French savants. Among the great scientific writers of modern France, in metaphysics and political economy, are Cousin, Jouffroy, Simon, Lamennais, Janet and Leroy-Beaulieu whose eloquent defense of spiritualistic and religious principles reacted strongly against the materialism to which French philosophy had long been addicted; while socialism has found powerful advocates in Comte, St. Simon, Fourier, and Leroux. Chevalier, De Tocqueville, Bonald, Laferrière, and Bastiat are known for their philosophic exposition of the jurisprudence of nations, and the social and political condition of democracy in the new and old world. In philology and ancient history, Champollion, Sylvestre de Sacy, Renan, Remusat, Stanislas Julien, De Rougé, Lenormant, Mariette Bey, and Maspero, by their profound researches into Egyptian and Semitic literature. Accadian (Babylonian) and Chinese civilization, have thrown new light on the origin of races and languages. In Romance philology Gaston Paris has rivaled the German scholar, Friedrich Diez. In mathematics, D'Alembert, Laplace, Lagrange, Biot, Ampere, and Arago stand unrivalled. In natural history, and its kindred sciences, among a host of great French discoverers, are Cuvier, Geoffroy and Isidore St. Hilaire, Blainville, Jussieu, D. Orbigny, Haüy, Gay-Lussac, Elie de Beaumont, Milne-Edwards, Brown-Séquard, Claude Bernard, Berthelot, Dumas, Paul Broca, and Pasteur.

No country has produced a greater number of elegant essayists and literary critics than France, and no language seems to lend itself more readily than French to a concise and graceful, yet forcible style of epigrammatic writing, and few admit of more idiomatic terseness, or greater polish. See Saintsbury's *Short History of French Literature* (1882); the *Histoire de la Litt. Française*, by Nisard (1846); Villemain, *Tableau de la Litter. au Moyen Age*

(1857); *Littré's Histoire de la Langue Française* (1867); Ferdinand Brunot, *Histoire de la Langue Française des Origines à* 1900; Gustave Lanson, *Histoire de la Litterature Française* (1895); Ferdinand Brunetière, *Manuel de l'Histoire de la Litterature Française* (1898); Petit de Julleville, *Histoire de la Langue et de Litterature Française* (1898); Gaston Paris, *Esquisse Historique de la Litteratiure Française au Moyen Age* (1907).

FRENCH'MAN'S BAY: inlet of the Atlantic Ocean, 30 m. long, average width 10 m., belonging to Hancock co., Me., containing several islands, and having Mt. Desert Island, a noted summer resort, on the w. of its entrance. It affords good harbor to shipping all the year round.

FRENCH POLISHING: common method of coating wood with a fine smooth surface of varnish of gum-lac. Gum-lac is easily soluble in spirits of wine, methylated spirits, or wood-naphtha, and a varnish is thus produced; but when applied simply with a brush, as copal, mastic, and most other varnishes are applied, the result is a rough and broken surface, instead of a smooth continuous polish. To obtain this with a lac-varnish on wood, it is necessary to apply a very small quantity at once, and to rub it continuously until it dries. If a dry rubber be used, the lac sticks to it, and it is dragged from the wood. An oiled rubber is therefore used, and the oil should be a drying oil, such as linseed. Various kinds of rubbers are used; such as a ball of wool covered with rag, a small roll of cloth with the edges downwards, and likewise covered with rag. The varnish and oil may be mixed together in a bottle, shaken up when used, and a little poured upon the rubber; or a simple solution of shellac may be used, and some of this laid upon an oiled rubber. Several successive coats and rubbings are required, and some skill is necessary, to produce a good surface.—The following are some receipts for French Polishing for mahogany; they might be multiplied to a great extent, for they should be modified according to the kind of wood to which they are applied, and the mode of applying them: 1. 5 oz. of pale shellac, dissolved in 1 pint of wood-naphtha, or methylated spirit, or spirits of wine. 2. 5 oz. of pale shellac, 1 oz. gum sandarac, 1 pint spirit. 3. $1\frac{1}{4}$ lb. pale shellac, $\frac{1}{4}$ lb. mastic, 2 quarts spirit. 4. Shellac, 6 oz.; spirit or naphtha, 1 pint; linseed oil, $\frac{1}{4}$ pint: the last is the most easy to apply; it requires no oil on the rubber, and is a very good domestic polish for restoring furniture, if properly applied by careful and continuous rubbing.

FRENCH POLITICAL PARTIES. See FRANCE.

FRENCH PROTESTANT CHURCH. See HUGUENOTS.

FRENCH RIVER: stream of Upper Canada, empties Lake Nipissing into Lake Huron, entering Georgian Bay, lat. 45° 53′ n., and long. 81° 5′ w. It has a rapid course of about 60 m. and, toward its mouth, is so uniform in breadth and depth, as to resemble an artificial cut through bare rock. It forms part of the route by which canoes,

preferring the Ottawa to the St. Lawrence, pass from Montreal to the Red River of the North.

FRENCH SETTLEMENTS IN INDIA. See PONDICHERRY.

FRENCH WAR (or OLD FRENCH WAR) IN NORTH AMERICA: 1752–63, caused by boundary disputes between the English colonists and the French. The disputes began to assume threatening form 1749 and culminated in war 1754. The Va. assembly granted £10,000 for frontier defense and 600 men were enlisted Jan.; N. Y. and S. C. raised three companies to aid Va.; the French erected Fort Duquesne on the site of Pittsburg; troops under George Washington attacked the French at Great Meadows and killed many with their commander, Apr. 17; Washington built Fort Necessity, was forced to surrender it; and then built Fort Cumberland; Md. voted £6,000 and N. Y. £5,000 to assist Va., and the British govt. sent over £10,000 and commissioned Gov. Sharpe, of Md., commander-in-chief. In 1755 Gen. Braddock was appointed commander-in-chief, and advancing from Cumberland, Md., against the French at Fort Duquesne was surprised, defeated, and mortally wounded by a combined French and Indian force when within 5 m. of the fort. John Winslow led a force from Boston to Halifax and with Col. Moncton captured the French forts on St. John's river and drove the French from the Bay of Fundy; William Johnson defeated French and Indians under Dieskau at Fort George; Montcalm captured the English forts, garrisons, and ordnance at Oswego 1756, Aug. 14, and Fort William Henry 1757; and the Penn. assembly offered bounties for Indian prisoners and scalps. A force of 50,000 British and colonial troops was raised and put under command of Gen. Abercrombie early in 1758; Gen. Amherst captured Louisburg after a 50-days' siege July 27; Abercrombie made an unsuccessful attack on Ticonderoga July 8, and was succeeded by Amherst; the French fired and abandoned Fort Duquesne Nov. 24, on the approach of Gen. Forbes; and the Indians began to sue for peace. In 1759, July, the French abandoned Ticonderago and Crown Point to Amherst; William Johnson captured Fort Niagara (24th); Gen. Wolfe defeated the French under Montcalm on the Plains of Abraham Sep. 13; and Quebec surrendered to the British Sep. 18. In 1760, Sep., the French gov. surrendered all French ports in w. Canada and returned with his army to France; and the war terminated officially 1763, Feb. 10, when the treaty of Paris was signed. The war cost the colonies 30,000 men and $16,000,000, of which $5,000,000 were reimbursed by the British government.

FRENCH WINES. See BORDEAUX; BURGUNDY WINES; CHAMPAGNE (Wine); WINES.

FRENEAU, *frē-nō'*, PHILIP: 1752, Jan. 2—1832, Dec. 18; b. New York: editor and poet. He graduated at Princeton College 1771, engaged in mercantile business,

made several voyages to the W. Indies, was captured by a British cruiser and imprisoned 1780, contributed a large amount of prose and verse of a burlesque-political character to the *Freeman's Journal* during the revolutionary war, became editor of the New York *Daily Advertiser* 1790, translating clerk to the state dept. under Sec. Jefferson, and editor of the Philadelphia *National Gazette* 1791. He subsequently published and edited for brief periods the *Jersey Chronicle* at Mount Pleasant, N. J., and the *Time Piece and Literary Companion* at New York, and resumed shipping business. He was a bitter opponent of the Federalists. He translated Robins's *Voyages and Travels* (1783), and published his *Miscellaneous Works* (1788); *Letters on Various Interesting and Important Subjects, by Robert Slender* (1799); and three vols. of *Poems* (1786, 95: and 1809).

FRENZY, or PHRENSY, n. *frĕn'zĭ* [F. *frénésie*, frenzy—from L. and Gr. *phrĕnēsis*, madness, delirium—from Gr. *phrēn*, the mind (see FRANTIC)]: any violent agitation of the mind approaching to madness; delirium: V. to drive to frenzy or madness. FREN'ZYING, imp. FREN'ZIED, pp. a. *-zĭd*, affected with frenzy or madness.—SYN. of 'frenzy': madness; insanity; lunacy; derangement; alienation; aberration; ecstasy.

FREQUENCY OF AN ALTERNATING CURRENT.—The number of complete cycles, or to-and-fro motion effected by the current in one second of time. The periodicity. See ELECTRO-DYNAMICS.

FREQUENT, a. *frē'kwĕnt* [F. *fréquent*—from L. *frequens*, or *frĕquen'tem*, often, repeated: It. *frequente*]: often seen; often done; often occurring. FREQUENT, v. *frē-kwĕnt'*, to visit often or habitually. FREQUENT'ING, imp. FREQUENT'ED, pp.: ADJ. often visited. FREQUENT'ER, n. one who. FREQUENTLY, ad. *frē'kwĕnt-lĭ*, at short intervals; many times. FRE'QUENCY, n. *-sĭ* [F. *fréquence*]: occurrence of a thing often, at short intervals. FREQUENTATIVE, a. *frē-kwĕn'tă-tĭv*, denoting the frequent repetition of an action—a term used in grammar. FRE'QUENTNESS, n. quality of being frequent or often repeated.—SYN. of 'frequently': often; commonly; ordinary; generally; usually; repeatedly.

FRÈRE, *frär*, CHARLES EDOUARD: French portrait, genre and landscape painter: b. 1837. His paintings have received two medals, in 1848 and 1865; his most important works being *Muleteer in the Alps* (1865); *The Basket-Sellers; Before the Rain* (1875); *The Surgical Operation* (1884); etc.

FRÈRE, *frär*, CHARLES THÉODORE: painter: b. Paris, 1815, June 24; d. there 1888, March 25. He studied with Coignet and Roqueplan, first exhibited in the French Salon 1834, went to Algeria 1836, was present at the capture of the city of Constantine by the French 1837, and spent many years in African and oriental travel. In 1869 he accompanied the Empress Eugénie on a voyage

up the Nile, and at her request made a sketch-book of aquarelles. His paintings obtained a second-class medal in 1848 and again in 1865, illustrate the every-day scenes, modes of life, bazaars and noted places and buildings sketched in his travels, and are elaborated with great care and skill especially in colors. The most noteworthy of them are a series of scenes in Constantine (1840–8); *Harem in Cairo; Ruins of Karnak; Bazaar in Damascus; Caravan of Mecca;* and *Festival in Constantinople.*

FRERE, *frēr,* Sir HENRY BARTLE EDWARD, D.C.L.,LL.D.: 1815, Mar. 29—1884, May 29: English diplomatist. He was educated at Haileybury College, for the Indian Civil Service, which he entered 1835. He rose rapidly, and 1850 became chief commissioner of Sind. For his services during the Indian Mutiny he was made a K.C.B., and was twice thanked by parliament. In 1862 he was appointed gov. of Bombay. In 1867 he was gazetted Knight Grand Cross of the Star of India, and was nominated a member of the Indian Council at home. In 1872 he went as special commissioner to Zanzibar, and signed a treaty with the sultan, abolishing the slave-trade. In 1877 he was named gov. and commander-in-chief at the Cape of Good Hope; and it was during this occupancy that the Kafir war of 1877–8 took place, and the Zulu war 1878–9. In these struggles, Frere's support from the British govt. was not prompt and full; yet his vigor and skill at last gave a successful issue. He was recalled soon after Mr. Gladstone came to office 1880. Holder of many honorary titles he was pres. of numerous learned societies (as the Royal Asiatic and the Royal Geographical and the Soc. for the Propagation of the Gospel in Foreign Parts), and wrote a number of works, mainly on themes connected with Christian missions in India and Africa. These works include *Pandurang Hari, or the Memoir of a Hindoo; Eastern Africa as a Field for Christian Labor* (1874); a *Memoir of the Right Hon. John Hookham Frere,* prefixed to the latter's works (1871–4); and numerous speeches, letters, etc. Consult Martineau, *Life and Correspondence of Sir Bartle Frere* (London 1895).

FRERE, *frēr,* JOHN HOOKHAM: 1769, May 21—1841; b. London: diplomatist and author. He was educated at Eton and Cambridge; in 1796 sat in parliament for a Cornish borough, and with his friend Canning supported the government strongly. He was one of the chief contributors to the *Anti-Jacobin,* contributing *The Loves of the Triangles,* a parody on Darwin's *Loves of the Plants,* and having a share with Canning in *The Needy Knife-grinder.* In 1800 he became plenipotentiary in Lisbon, and two years afterward in Spain, where his position was one of extreme difficulty. He was recalled after the disastrous retreat to Corunna, which was popularly considered a result of his urgent advice to Sir John Moore; this ended Frere's public life. In 1816, he married the dowager countess of Erroll; and four years later, for her health, he went to reside in Malta, where he applied himself to the

study of Greek, Hebrew, and Maltese, and was famous for hospitality. He twice declined a peerage. His translations of Aristophanes remain without a parallel or rival in English. *The Acharnians, The Knights, The Birds,* and *The Frogs,* were privately printed and did not become widely known till 1847, when Sir G. Cornewall Lewis made them public in The Classical Museum. In 1817 he produced a literary burlesque, full of charming verse and excellent character-drawing, entitled *Prospectus and Specimen of an Intended National Work by William and Robert Whistlecraft, of Stow-market in Suffolk, Harness and Collar Makers, intended to comprise the most interesting particulars relating to King Arthur and his Round Table.* Byron used this as a model for his *Beppo* and *Don-Juan.* Frere's works, with a memoir, were published 1871 by his nephews, W. E. and Sir Bartle Frere.

FRÈRE, Pierre Édouard: 1819, Jan. 10—1886, May 28; b. Paris; genre painter. He studied in the School of Fine Arts and with Delaroche, and first exhibited in the Salon 1843. He received third-class medals 1850, 55, second-class 1852, and the cross of the Legion of Honor 1855. His specialty comprised domestic interiors, scenes and manners in humble life, and a variety of child-life episodes; and many of his finest compositions have had wide circulation through lithographs. He was one of the most sane and wholesome of the French genre painters, he had a fine sense of color, and his pictures of child-life and humble and lowly household scenes are full of sentiment. The most noted of his paintings are: *First Steps; Curiosity; The Little Cook; Little Jourmand; Repose; The Library;* and *Going to School.*

FRÉRON, *frā-rōng′*, Élie Catherine: 1719–1776, Mar. 10; b. Quimper: French writer. He was educated under the Jesuits at the college of Louis le Grand, and became known by his publication of a critical journal 1746, under the curious title, *Lettres de Madame la Comtesse de * * * *.* It was suppressed 1749, but virtually reappeared as *Lettres sur quelques Écrits de ce Temps* (13 vols., 1749–54), and was again continued under the title of *Année Littéraire* (1754–76). Fréron showed intense bitterness against his leading contemporaries. A worshipper of the age of Louis XIV., he hated and satirized the leveling philosophy of his times. Voltaire was the special object of his aversion, and that sensitive scoffer was deeply galled by the weekly diatribes of his antagonist; the names of Voltaire and Fréron are inseparably, though not amicably, joined in the history of literature. Fréron was often right in his criticisms and in the accusations which he brought against his adversaries; but opinion in France in the 18th c. was swayed by epigrams, and Frèron fell a victim to the animosity of the wits, and died of grief.—His son, Louis Stanislas Fréron (1765–1802), was prominent in the French Revolution, first as a violent radical, later as a re-actionist; and in 1802 was sent as subprefect to the island of St. Domingo, by the First Consul, but died two months after his arrival.

FRESCO, n. *frĕs'kō* [It. *fresco*, fresh]: duskiness like that of the evening or the morning; coolness; a method of painting on walls freshly plastered. AL FRESCO [It.]: in the open air. FRESCO-PAINTINGS, so named as painted on walls whose plaster is still *fresh* or damp.

FRES'CO, or FRES'CO-PAINT'ING, or PAINT'ING IN FRES'CO: painting executed on plaster while wet or fresh. Many celebrated artists and well-known writers have maintained that F. is the only way in which the highest efforts in art should be embodied. A very large proportion of the best works of the Italian schools, particularly of Rome and Florence, are in F.; and during the present c. it has been revived, and many of the chief paintings of the modern German school are executed in this manner. The practice has to some extent been introduced into Britain, e.g. some works in the new Houses of Parliament. Munich has been the chief home of this revived art.

In this process, first, a cartoon or drawing on paper of the subject is executed with a correct outline, and the shading and effect fully made out. The finished cartoon may be either of the same size as the intended fresco, or on a smaller scale; but, at all events, an *outline* of the same size as the fresco-painting is necessary. When the finished cartoon is made the same size as the fresco, it is generally executed in black and white, with chalk or charcoal, but it is essential to have also a careful study of the subject in colors: this in most cases is on a small scale. The colors used are mostly earths or minerals, as few others will stand the action of lime: these are ground and applied with pure water. The ground to be painted on is the last or smooth coating of plaster that is laid over the rough plaster-work with which walls are prepared. This last coating or ground, or rather as much of it as the artist calculates on being able to cover in one day, is laid on immediately before he begins work. The surface is wet, but firm and smooth; the tracing is laid over the portion prepared, and the artist, with a point of hard wood or bone, goes over the lines of the tracing, and slightly indents them on the plaster. He then proceeds with his work, the finished cartoon and colored sketch being hung or placed near him for guidance. After his day's work is over, any portion of the plaster that has not been painted on, or that may remain beyond or at the edge of his work, is cut away; and next day, when the painter is ready to commence work, the plasterer is at hand, and joins closely another portion of plaster to the edge of the portion painted on the previous day, which, when cut, had been slightly sloped. The lime, in drying, throws out a kind of crystal surface, which protects the color, and imparts a degree of clearness much superior to, and easily distinguishable from, that of a work in tempera or size paint. This process, apparently simple, requires great dexterity and certainty of hand; for the surface of the plaster is delicate, and must not be overworked, besides, the lime imbibes only a certain quantity of additional moisture in the form of liquid colors, after which it loses its crystallizing quality,

and the surface, or a portion of it, becomes what painters call rotten: many frescoes are defective in this way. It is only after the lime has dried that such flaws are discovered; the proper plan, in such a case, is to cut away the defective portion, have fresh plaster laid on, and do the work over again. But the flaws are too often retouched with tempera or size colors; and though they may escape notice for a time, the parts touched will change or come off in a few years. Another difficulty in F. is, that the colors become much lighter after the plaster dries, and allowance must be made for this. However, by practice, the painter may soon overcome this difficulty; and he can test the difference between the color as wet and as dry, by putting a touch on a piece of umber that he usually has at hand, which instantly dries the color, and shows it as it will be when the lime has dried.

The pre-eminence claimed for F. is founded on—1. The quality that it possesses of clearness and exhibiting colors in a pure and bright state. The surface not being dry and dull, as tempera or size color, nor glossy like oil-paintings, is capable of being favorably viewed from any point. 2. Its durability—many frescoes being painted on arcades or the cloisters of churches open on one side, some on the fronts of houses entirely exposed in the open air. 3. The skill and dexterity required in execution—retouching not being admissible, nor those various appliances of glazing over painting, etc., available in working with oil-colors; all which circumstances compel the F.-painter to confine his energy more to the subject and design, than to the mechanical qualities so much sought by painters in oil. The frescoes by Michael Angelo in the Sistine Chapel, by Raphael in the stanze of the Vatican, and those by Correggio in the cupola of the cathedral of Parma, are pointed to by the advocates of this mode of art as settling the question.

But, on the other side, it may be said—1. Though a certain degree of clearness and purity of color results from fresco, it is deficient in depth and richness. The absence of glossiness is no doubt an advantage in the case of mural-painting with reference to architectural decoration; but to a considerable extent this difficulty can be obviated in painting in oil; and Delaroche's great picture of the Hemicycle in the Beaux Arts in Paris, which is in oil is not objectionable on that ground—indeed, many mistake it for fresco. 2. No doubt, in F., the colors are not liable to change much, if the work be executed in pure F. and not retouched; but, generally speaking, the surface is fragile, and easily broken or scratched, and there is no way of mending it but by retouching with tempera colors, and if that be extensively done, its nature is altered, and it becomes a picture in size colors. The *Madonna de Foligno*, *Madonna di San Sisto*, *Sposalizia*, and other celebrated easel-pictures by Raphael, are in much better preservation than his frescoes in the stanze of the Vatican. 3. The properties of difficulty in execution and limited range of coloring and of technical appliances, are of a negative

kind. No doubt, some painters have maintained that good coloring is incompatible with grand compositions; but, in rebuttal, Titian's *Entombment* in the Louvre, and Peter Martyr in Venice, among others, are referred to.

Mural-painting is of great antiquity: in Egypt, in the Etruscan tombs, on the walls of houses in Pompeii, and in the catacombs, are various remains of paintings generally considered frescoes; those in Pompeii, in particular, are remarkable for grandeur and purity of style in design and drawing; but they are executed in a slight and free manner, and on this account, and from the same or nearly similar subjects being often found repeated, are supposed to be copies by house-decorators of celebrated paintings preserved in temples or palaces at Rome. Whether these were frescoes painted on the walls or movable pictures, is matter of dispute. 'The Greeks preferred movable pictures, which could be taken away in case of fire, or sold if necessary.'—Wilkinson on *Egyptian and Greek Paintings.* Pliny says Apelles never painted on walls; and various pictures of immense value are stated to have been taken from Greece to Rome. On the whole, it may be assumed as an opinion long and generally held, that where painting is to be combined with architecture, F. is the style that assimilates most with it. On the other hand, the fact of Delaroche having so successfully executed in the Beaux Arts a work in oil which by size and subject was well adapted for F., and the adoption lately in Germany, and by the artists in the British houses of parliament, of stereochromic painting (see below) in place of F.—a method by which certain defects in the process of F.-painting are said to be obviated—militate against some of the opinions hitherto adopted as to the advantages of F.-painting.

Fresco Secco is a spurious kind of F., much used in Italy in ordinary house-decoration. The colors, mixed in water, are laid on the wall after the plaster is dry, and adhere in a certain degree by absorption, the hard or glassy surface which forms on plaster after it dries being first removed by pumice or otherwise. Pictures executed in this manner appear coarse and dry, or rotten, and are in every way inferior to pure fresco.

Stereochromic Painting [Gr. *stereos,* firm, and *chroma,* color].—The ordinary process of *fresco secco* has lately assumed great importance from a discovery by the late Dr. J. R. von Fuchs, and others, of what is called water-glass (see Glass, Soluble), which being passed over the surface of a work executed in fresco secco, imparts much brilliancy, and fixes and gives great durability to the colors; this method is styled stereochromy, and has been extensively practiced in Berlin by Kaulbach and other eminent German artists. The late Prince Albert was so much impressed by the bearing of this discovery on the art of mural-painting, that he translated from the German a pamphlet describing the 'manufacture, properties, and application of water-glass (soluble alkaline silicate), including a process of stereochromic painting,' and printed it for private circulation. Mr. Maclise, R.A., made use of this new style of

art in executing his great picture in the palace of Westminster of the '*Meeting of Wellington and Blucher at Waterloo.*'

FRESCOBALDI, *frĕs-kō-bâl'dē*, GIROLAMO: 1587–1654; b. Ferrara, Italy: organist and composer. He is said to have studied music at his birthplace with Millevilie; acquired early celebrity with his rich, strong voice; spent some years in Belgium, and settled in Milan about 1608. In 1627 he removed to Rome, and 1630 became organist of St. Peter's cathedral. That he had acquired wide repute as a virtuoso on the organ is indicated by Baini's statement that 'no less than 30,000 people flocked to St. Peter's on his first appearance there.' His compositions embraced works for the organ replete with the finest results of fugal treatment, a collection of madrigals for five-voices (Antwerp 1608), and numerous vocals, hymns, canzone, and motets. He also was famous as a teacher, and had for a pupil Frohberger, celebrated German organist and precurser of Bach.

FRESH, a. *frĕsh* [AS. *fersc;* Dut. *versch;* Icel. *friskr;* It. *fresco;* F. *fraische*, recent; new: comp. Gael. *fras*, a fall of rain]: cool like the atmosphere during and after rain in warm weather; brisk; moving with celerity; not impaired or faded; not forgotten; not tainted; not stale; recent; healthy in look or feeling; not salt; unpracticed; *familiarly*, tipsy: N. in *OE.*, spring; freshet: V. in *OE.*, to freshen; to refresh. FRESH'LY, ad. *-lĭ.* FRESHNESS, n. newness; vigor; coolness; ruddiness. FRESHEN, v. *frĕsh'n*, to make fresh; to grow fresh; to free from salt; to grow brisk and strong, as the wind. FRESHENING, imp. a. *frĕsh'nĭng*, making or growing fresh; refreshing. FRESHENED, pp. a. *frĕsh'nd*, made fresh; deprived of saltness. FRESH'ES, n. plu. *-ĕz*, the mingling of salt and fresh water in rivers or estuaries. FRESH'ET, n. *-ĕt*, the sudden flood in a river from rain or melted snow. FRESH-BLOWN, newly-blown. FRESH'MAN, n. a university student during his first year; a novice. FRESH-SHOT [a form of *freshet*]: the discharge of a large river into the sea, in consequence of which fresh water is often found on the surface at a distance from the mouth of the river. FRESH-WATER, n. water without saltness: ADJ. connected with fresh-water; applied to sailors who have not been on long sea-voyages; unskilled; unfamiliar.—SYN. of 'fresh, a.': cool; new; recent; unimpaired; untainted; undried; uncured; florid; vigorous; cheerful; unfaded; ruddy; strong; lively; raw; unripe; sound; sweet; good; inexperienced; unused.

FRESH-AIR FUND: money collected to provide poor children of New York with a fortnight's rest in the country during summer seasons. The scheme was projected 1877 by Rev. Willard Parsons, of Sherman, Penn., who selected 60 poor and sick children in New York, took them to his own and his parishoners' homes, and kept them a fortnight free of charge. The New York *Evening Post* took up the work of collecting funds, selecting children, and caring for them, and carried it on under Mr. Parsons' management four years, when (1882) the New York *Tribune* assumed

charge. Since then the movement has largely developed and there are numerous organizations carrying on the work in New York City and in over 38 cities throughout the states. The work is undertaken in nearly all European countries, and in Argentina in South America; the first of the European vacation colonies was established at Zurich, Switzerland, 1876; Germany developed the plan the same year.

FRESH'WATER HER'RING. See COREGONUS.

FRESH'WATER MUS'SEL: popular name of a whole family of lamellibranchiate mollusks, *Unionidæ* (sometimes called *Naiadæ*), allied to muscles (*Mytilidæ*), but having a much larger foot, which does not generally produce a Byssus (q.v.), except in the very young animal. All the known mollusks of this family are inhabitants of fresh water, some being found in still, and some in running waters. A few species are European; but it is in N. America chiefly that they abound, its lakes and river producing many species. They crawl about by means of the foot; many generally live immersed in mud. They are supposed to feed on animalcules, and on decomposed animal and vegetable matter. The epidermis of many is brilliantly colored, and the inside of the shell is lined with a brilliantly and variously colored nacre, so abundant as to be sometimes used for mother-of-pearl. Pearls are sometimes produced. The most northern European species, found in parts of Britain, and in Norway and Sweden (*Unio* or *Alasmodon margaritifera*, *Mya margaritifera* of Linnæus) inhabits the rivers of mountainous and hilly districts with a rocky bed, and has long been celebrated for the pearls which it produces. It is about $2\frac{1}{2}$ inches long by 5 broad, and has a thick blackish-brown shell, with a toothed hinge. The pearls of the British rivers were famous among the ancient Romans; and Suetonius represents them as having formed an inducement for Cæsar's expedition. Some of the rivers of Wales, and of the n.w. of England and Scotland, have at various times produced beautiful and valuable pearls. In several of the rivers and lochs in Perthshire, Scotland, muscle gathering for pearls is a business by which many families get subsistence. A pearl from the Conway, presented by Sir Richard Wynn to the queen of Charles II., is among the ornaments of the British crown. Large and fine pearls have been procured also from rivers of Tyrone and Donegal. See MUSSEL.

FRESH'WATER STRATA: rocks, named from their supposed origin. This can be easily determined from an examination of the contained fossils. Though the great proportion of aqueous rocks are of marine origin, yet Freshwater Strata are occasionally found. The yellow sandstones of the Old Red or Lower Carboniferous period are freshwater beds, as are also the Burdic-House limestone in the Edinburgh coal-field, the Purbeck beds in the Oolite, the Wealden beds in the Chalk, and the Hempstead and other beds in the Eocene period.

FRESISON, n. *frĕs′-ī-son* (a word without etymological meaning but designed to have its letters symbolic): in logic the fifth mode of the fourth figure of syllogisms. See SYLLOGISM AND MOOD IN LOGIC.

FRESNEL, *frā-nĕl′*, AUGUSTIN JEAN: 1788, May 10—1827, July 14; b. Broglie, dept. of Eure: French physicist. He was educated at Caen at the École Polytechnique, and at the École des Ponts et Chaussées; and served as govt. engineer. He investigated the polarization of light with so much success, that though in a letter 1814, Dec. 28, he asks a friend to get him some books on the subject, as he did not know what the phrase 'polarization of light' meant ('Je ne sais ce qu'on entend par la polarisation de la lumière'), yet before the end of the following year he ranked among the first authorities on the question. Not knowing, it is said, the result of Young's labors Fresnel demonstrated to his countrymen the error of the Newtonian theory of the propagation of light by the emission of material particles, and ably advocated the undulatory hypothesis. The result of his researches was exhibited in a memoir, crowned by the French Académie des Sciences 1819. With Arago, he investigated the action of polarized rays of light on each other; and the discoveries, published in a joint memoir, confirmed his previous theory. His practical application of the new theory to the improvement of the light-house system was of incalculable value, and has quite abolished the old method: see LIGHT-HOUSES. In 1823, Fresnel was elected a member of the Académie des Sciences; 1825, a member of the Royal Soc. of London, from whom he received, 1827, the Rumford medal.

FRESNO, *frĕs′nō:* city of central Cal., capital of Fresno co., on two railroads, 205 m. s.e. of San Francisco, in a fertile fruit, grain, stock-raising, and petroleum district. Raisins are extensively exported with other fruits, manufactured wines and brandies, grain, sheep, and horses. Fresno has a fine Federal building, Carnegie library, is lighted by electricity and has electric street-railroads, the power for which is derived from the San Joaquin falls 40 m. away. Pop. (1900) 12,470; (1910) 24,892.

FRET, v. *frĕt* [Bav. *fretten,* to rub; Swiss, *fretten,* to become sore by rubbing: AS. *fretten,* to gnaw: L. *fricārĕ:* It. *fregare:* comp. Gael. *friotach,* fretful, ill-natured]: to wear away by rubbing; to corrode; to be peevish and irritable; to be vexed; to irritate; to vex; to make rough on the surface; to agitate, as water: N. agitation of mind. FRET′TING, imp.: ADJ. wearing away; vexing; eating. FRET′TED, pp.: ADJ. eaten; rubbed or worn away; made rough on the surface; vexed; agitated violently, as by the passions or the wind. FRET′FUL, a. *-fûl,* given to complain of small grievances; irritable; peevish. FRET′FULLY, ad. *-lĭ.* FRET′FULNESS, n. ill-humor; peevishness.—SYN. of 'fretful': cross; petulant; ill-humored; ill-natured; waspish; captious; splenetic; angry; passionate.

FRET, v. *frĕt* [OF. *freter,* to interlace; *frete,* the iron

hoop which keeps a wooden tool from riving; *frettes*, an iron grating: It. *ferrata*, the grating of a window: Sp. *fretes*, the bands forming the body of a shield: Sp. *fres*, gold lace: mid. L. *frisum*, lace, ornamented border]: in *her.* and *arch.*, to ornament by interlacing bars or fillets; to variegate; to diversify: N. in *her.*, a figure resembling two sticks laid saltierwise and interlaced with a mascle; small bands or fillets interlacing each other at right angles; ornamented work in embroidery or carving. FRET′TING,

Fret.

Fretty.

imp.: ADJ. variegating with bands or fillets. FRET′TED, pp.: ADJ. interlaced; variegated; ornamented with raised or fret work. FRET′TY, a. *-tĭ*, adorned with fretwork; in *her.*, applied to a shield with six, eight, or more pieces crossing and interlacing. FRETWORK, work adorned with frets; a wood surface cut into a lace-like pattern. FRETTED-ROOF, a roof ornamented by bands or fillets crossing each other in different patterns. FRET′TISED, a. *-tĭst*, formed by a collection of frets.

FRET, n. *frĕt* [L. *frĭtĭnīrĕ*, to twitter as a swallow: It. *frizzare*, to quaver with the voice: F. *fredonner*, to quaver in singing or playing: comp. Gael. *fraidh*, a partition]: in *OE.*, a note in music; the partitions or marks on the neck of a guitar, a viol, or similar stringed instrument, to guide the fingers in the formation of the notes. *Note.*—Skeat expresses the opinion that FRET is only a particular application of the OF. *frete*, a ferrule or iron hoop.

FRETTING: the abrasion of a cutting tool when it is sharpened on an oil stone.

FREUDENSTADT, *froy′dĕn-stât:* pretty town in Würtemberg, 40 m. s.w. of Stuttgart, on a rock washed by the Murg. It was founded 1599 by Duke Frederic I., and peopled by Prot. refuges from Austria. It has considerable trade in wood, cattle, and fruit. Cotton-spinning, weaving, nail-making, etc., are the principal industries. Pop. 6,500.

FREUND, *froynt*, WILHELM, PH.D.: lexicographer: b. Kempen, Prussia, 1806, Jan. 27. He studied in Breslau, Berlin, and Halle, received his degree and opened an institution for the instruction of yc g Jews in Breslau 1828, became prof. in a college there and afterward in Hirschberg, spent 1851 in England, became director of a high grade Jewish school established on his plans at Gleiwitz 1855, and retired to Breslau 1870. His works embrace *Wörterbuch der lateinischen Sprache*, 4 vols. (Breslau 1834–45); *Gesamtwörterbuch der lateinischen Sprache*, 2 vols. (1844–5); *Lat.-deutsche und deutsche-lat.-griech. Schul-*

wörterbuch, 2 vols. (Berlin 1848–55); *Sechs Tafeln zur griech.-römischen u.s.w. Litteraturgeschichte* (Leipsic 1873–75); and *Freund's Schülerbibliothek* (1859–83).

FREY, *frī*, Albert Romer, American author: b. N.Y. 1858, Feb. 17. He is secretary of the Shakespeare Society of New York and has written in refutation of Ignatius Donnelly's *cipher* theory of Shakespearian authorship. Among his other writings are *William Shakespeare and Alleged Spanish Prototypes* (1885); *Soubriquets and Nicknames* (1887).

FREYCINET, *frā-sē-nā'*, Charles Louis de Saulces de: French statesman: b. Foix, 1828, Nov. 14. He was educated in the Polytechnic School, Paris, entered the corps of mines and was employed by the govt. on several important public works 1848, was engineer of mines at Mont-de-Marsan, Chartres (1854), and Bordeaux (1855), director-engineer of the S. system of railroads 1855–61, engaged in scientific and industrial work for the govt. in France and abroad, appointed engineer of the first class 1864, and became a member of the conseil-gen. of the dept. of Tarn-et-Garonne. In 1870 he was appointed prefect of the dept., and was chief of the war dept. under Gambetta 1870–1. He was elected senator 1876, became minister of public works in the Dufaure ministry 1877, and held the office in the ministries of Waddington and Grévy, was appointed pres. of the council and took the portfolio of foreign affairs 1879, Dec. 27, resigned 1880, Sep. 19; was recalled as pres. of the council and again took the direction of foreign affairs 1882, Jan. 31; resigned July 29, was again premier and foreign minister 1885, Apr.—1886, Dec.; was in the ministry a short time 1887, became minister of war under Premier Floquet 1888, Apr. 1, holding office until the resignation of the ministry 1892, Feb. 19.

FREYJA, *frī'ja*, and FRIGGA, *frĭg'ga:* in northern mythology, spoken of as distinct, but originally one, and intimately associated with Freyr. Frigga, in the genealogy of the Ases (q.v.), is the supreme goddess, wife of Odin, and one of the daughters of the giant Fiörgwyn, and presides over marriages. Freyja is daughter of Niord. sister of Freyr, and goddess of love. She is drawn on a car yoked with cats; to her, deceased women go, also the half of those that fall in battle, whence she is called Val-Freyja. In this last respect, she must be considered as signifying the Earth; but the earth is also represented by Frigga, wife of Odin, and when Freyja seeks Odin, as Isis seeks her Osiris, this is Odin conceived as the Sun. The names also, Frigga and Freyja, are in signification almost alike, and the two are often confounded in mythology. The Anglo-Saxons and Lombards worshipped the wife of Odin as Frea. The name survives in *Friday*.

FREYR, *frīr:* in northern mythology, son of Niord, of the dynasty of the Vanagods. He was adopted with his father among the Ases (q.v.), who, when he got his first tooth, bestowed on him the celestial castle Alfheim. He

is the god of peace and fertility; dispenses rain and fruitfulness; and to him prayers for a good harvest are addressed. His wife is Gerda, daughter of the giant Gymer. Freyr had seen her as he once ascended the lofty seat of Odin, Hlidskialf, from which everything on earth is seen. Gerda was so beautiful, that the brightness of her naked arms illuminated air and sea. Seized with violent love, Freyr sent Skirnir as spokesman, and for his services had to give him his good sword, which he will miss in the great final contest or eclipse of the gods. Like Freyja, he was the patron of marriage, and probably the two were at one time conceived as united, hermaphrodite-wise. Freyr was held in great veneration, especially in Sweden of which he was patron-god, also in Iceland. His chief temple was at Upsala, where a bloody offering was yearly made to him of men and animals. His festival was at the winter solstice, the turn of the year—Yule-tide. While the god was borne round the land, all strife was laid aside. (Does 'the procession of the boar's-head,' at Christmas-time, commemorate Freyr, who rode on the boar, Gullinbursti, and whose symbol was the boar's-head?) The circumstance that the Saxon form of Freyr's name, Fro. has been preserved in the German name of a Christian festival, Fronleichnam (*Corpus Christi*, the Lord's body), seems to show that it had become among these peoples the abstract term for a god.

FREYTAG, *frī'tâch*, GUSTAV: dramatic poet and novelist: b. Kreuzburg, in Silesia, 1816, July 3; d. Weisbaden 1895, April 30. He studied at the universities of Breslau and Berlin, and took his degree in philosophy 1838. His first important work was a comedy, entitled *Die Brautfahrt, oder Kunz von Rosen* (Breslau 1844). Among his productions are: *In Breslau* (Berlin 1845), a collection of small poems in a popular style; the dramas *Die Valentine* (Leip. 1847) and *Graf Waldemar* (Leip. 1848); and the comedy *Die Journalisten* (1854). An edition of his dramatic works was published at Leipsic in three vols., 1848–50. But his greatest achievement in literature is undoubtedly *Soll und Haben* (Leip. 1855), a novel of German citizen-life. It has been translated into English by Mrs. Malcolm under the title of *Debit and Credit* (1858). In 1859, Freytag published a new classical drama, *Die Fabier*. A series of prose pictures from German History, entitled *Neue Bilder aus dem Leben des Deutschen Volkes* (Leip. 1862; Eng. trans. *Pictures of German Life*), followed the series, *Bilder aus der Deutschen Vergangenheit. Die Verlorene Handschrift* (*The Lost Manuscript*), appeared 1864. The series of tales called *Die Ahnen* includes *Ingo und Ingraban, Das Nest der Zaunkönige, Die Brüder vom Deutschen Hause,* and *Markus König* (1876). Freytag has written also on the rules of the drama. In 1870, he retired from the editorship of the *Grenzboten,* which he had conducted 23 years.

FRIABLE, a. *frī'ă-bl* [F. *friable*—from L. *frĭābĭlĭs*, that can be crumbled to pieces—from *frĭō*, I rub, I crumble: It.

friabile]: easily crumbled; easily reduced to powder. FRI'ABIL'ITY, n. *-bĭl'ĭ-tĭ*, or FRI'ABLENESS, n. *-bl-nĕs*, the quality of being easily crumbled to powder.

FRIAR, n. *frī'ėr* [F. *frère*, a brother—from L. *frātrem*, a brother]: name common to the members of certain religious orders in the Rom. Cath. Church, and generally employed in distinction from the name Monk (q.v.) and Regular Clerk (q.v.). The name friar, though from its etymology (*frère*, brother) it belongs to the members of all religious brotherhoods, yet has come to be reserved almost exclusively for the brethren of the Mendicant orders, and is applied chiefly to the four great orders Dominicans, Franciscans, Augustinians, Carmelites, and later, to the Trinitarians, and to the various branches of these orders. The Franciscans were properly denominated 'Friars Minor' (*Fratres Minores*). The Dominicans received, in contrast, the title 'Friars Major,' which, however, was perhaps rather a sobriquet than a serious name. These several bodies of friars were also popularly called, from the color or other peculiarity of their habit, Grey Friars (Franciscans), Black Friars (Dominicans), White Friars (Carmelites) Crutched [or crouched (*Cruciati*, 'crossed')] Friars (Trinitarians), so called from the cross which was embroidered upon their habit. This is the origin of the names of the several localities in London, and other towns thus designated, to the present day. In the orders above referred to, the friars who are in priest's orders are styled 'father'; the other members simply 'brother.' The vow taken by friars at profession is of the class called in the Rom. Cath. Church 'solemn,' and is held to render null and void any contract of marriage entered into by the party subsequently to his religious profession. FRI'ARLIKE and FRI'ARLY, a. *-lĭ*, after the manner of a friar, or one not experienced in the ways of life. FRI'ARY, a. *-ėr-ĭ* pertaining to friars: N. a monastery of friars. FRIAR-BIRD, so called because its head and neck are bare of feathers, one of the family *Meliphogidæ*, or Honey-eaters; found in Australia; called also the Monk, Leather-head, Poor Soldier, Pimlico, and Four-o'clock.

FRI'ARS BAL'SAM. See BENZOIN.

FRIBBLE, v. *frĭb'l* [prov. F. *friboler*, to flit to and fro without fixed purpose: F. *frivole*, trifling: comp. Gael. *frith*, small, and *buail*, to strike]: to totter like a weak person; to trifle: ADJ. silly; trifling: N. a trifler. FRIB'BLING, imp. *frĭb'lĭng*. FRIBBLED, pp. *frĭb'ld*. FRIB'BLER, n. *-lėr*, a frivolous fellow; a trifler.

FRICASSÉE, n. *frĭk'ăs-sē'* [F. *fricassée*—from *fricasser*, to fry, to stew meat cut into small pieces—from L. *frigo*, I roast, I fry]: a dish made by cutting any kind of flesh or fowl into small pieces, and stewing or frying them with sauce; a hash: V. to dress as a fricassée. FRIC'ASSEE'ING, imp. *-sē'ĭng*. FRIC'ASSEED', pp. *-sēd'*. FRIC'ANDEAU', n. *-ăn-dō'* [F.]: a certain prepared dish of veal.

FRICK, HENRY CLAY, American manufacturer: b.

West Overton, Pa., 1849, Dec. 19. He began commercial life in a small coke business, which grew to be the largest in the country, and is now president of the H. C. Frick Coke Co. He was prominent as instrumental in putting an end to the Homestead Strike (1892) and has been president of the Carnegie Steel Co.

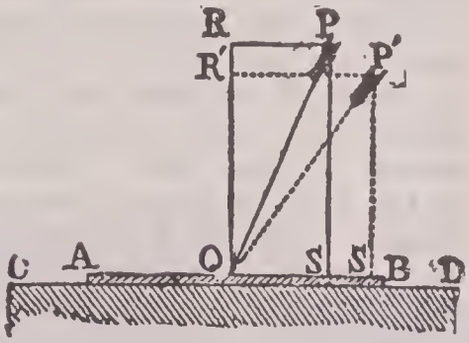
FRICTION, n. *frĭk'shŭn* [F. *friction*—from L. *frictĭōnĕm*, a rubbing—from *frĭcō*, I rub: It. *frizione*]: the act of rubbing; the resistance produced by the rubbing of bodies against each other; FRIC'TIONAL, a. *-ăl*, relating to friction; moved or produced by friction. FRIC'TIONLESS, a. *-lĕs*, having no friction.

FRICTION: act of, or resistance produced by rubbing of one body or substance against another. As a considerable proportion of the motive power in all operations is spent in overcoming the friction of the parts of the machine upon one another, and is thus lost for the useful work, it is of great importance to understand the nature of this obstructive force, with a view to reduce it to the least possible amount. The result of many careful experiments is a number of precise and valuable facts or laws regarding friction, which are now considered certain. The more important may be thus stated and illustrated.

When a block of oak—say a cubic foot, which weighs about 60 lbs.—is placed on a horizontal table of cast iron, the two surfaces being flat and smooth, it requires a force of nearly $\frac{2}{5}$ the weight of the block, or 24 lbs., pulling horizontally, to make it slide along the table. This measures the friction between the two surfaces. Another block of the same size and shape laid on the same table, would require the same force to draw it; and if the two were laid side by side, and fastened together so as to become one block, it would evidently require double the force, or 48 lbs., to draw the double block; the amount of the friction being thus still $\frac{2}{5}$ of the weight, or of the pressure between the two surfaces. But suppose that, instead of being laid side by side, the second block were laid on the top of the first, what is to be expected? Here the weight is doubled as before, but the extent of rubbing surface remains unaltered; it would be natural, therefore, to expect that this would make a difference, and that, though the friction would, of course, be increased, the increase would be less than in the former case. Experiment, however, shows that there is no difference, and that the friction is just double in both cases. In short, the unexpected and important fact is established, that, *within certain limits, the friction of any two surfaces increases in proportion to the force with which they are pressed together, and is wholly independent of the extent of the surfaces in contact.* The amount of friction between two bodies is thus a constant fraction or proportion of the force with which they are pressed against each other. This fraction differs for the different kinds of surfaces. Thus, between oak and cast iron, it is, as already stated, about $\frac{2}{5}$, or more exactly, ·38; for wrought iron on wrought iron (we speak at

present of dry surfaces, without grease or unguent of any kind), it is ·44; for brass upon cast iron, ·22. This constant fraction (expressing the proportion between the pressure of two surfaces and their friction) is called the *coefficient of friction* for these two surfaces.

Another way of illustrating this law of friction is the following, which has an important bearing on the erection of structures, and on mechanics in general. Suppose a slab AB, in contact with another slab CD, of the same or of different material; and that a force PQ presses on AB obliquely. Let QR be the perpendicular to the two surfaces, and draw PR, PS parallel to AB and QR, thus resolving the force PQ into two forces, one, PS, pressing AB against CD, the other, PR or SQ, tending to make AB slide towards C. It will clearly depend upon the strength of friction between AB and CD, how far the force PQ may be made to decline from the perpendicular without actually causing the one body to slide on the other. Suppose that when the pushing force is brought into the position PQ, AB is just ready to slip on CD, and that it is a case of oak upon iron; then, since P′S′ or R′Q is the force pressing the surfaces together, and P′R′ or S′Q the force tending to produce motion, P′R′ will be $\frac{2}{5}$ of R′Q. The angle P′QR′ is called *the limiting angle of resistance* of the two surfaces AB, CD; for so long as the direction of the pressure PQ is within that angle, the friction of the surfaces will sustain it; but if the obliquity is greater, the surfaces will slip. This is true, independently of the extent of the surfaces in contact; and also of the amount of the pressure; for the stability depends upon the proportion of PR to RQ, and that is the same, whatever is the length of PQ, so long as its inclination is the same. If the slab CD were tilted up, so as to form an inclined plane, until AB were on the point of sliding, the angle of inclination would be found to be equal to the limiting angle of resistance RQP′.



Knowing the coefficient of friction of any two substances, their limiting angle of resistance is easily found. *Example.*—The coefficient of brick upon hard limestone is ·60; required the limiting angle. Take a line QR′ of any convenient length, raise a perpendicular R′P′ equal to $\frac{6}{10}$ of QR′, and join QP′; R′QP′ is the angle required: if measured it would be found to be about 31°. In any structure, then, the obliquity of the thrust between two surfaces of these materials must always be considerably within this limit, in order to be safe.

The *friction of quiescence*, that is, the resistance to the commencement of motion, is greater than the resistance to its continuance; and the more so if the surfaces have been a considerable time in contact. But the slightest shock or

jar is sufficient to destroy this cohesion, or whatever it is that constitutes the peculiar initial resistance; so that it is only the constant and regular friction of motion that is of much consequence in practice.

Friction is very much diminished by the use of grease or unguents. The coefficient of wrought iron upon oak, which, in the dry state, is ·49, is reduced by the application of water to ·26, and by dry soap to ·21. The result of experiments on this subject is stated to be, 'that with the unguents, hog's-lard and olive-oil, interposed in a continuous stratum between them, surf ces of wood on metal, wood on wood, metal on wood, and metal on metal (when in motion), all have very nearly the same coefficient of friction, the value of that coefficient being in all cases between ·07 and ·08.' Tallow gives the same coefficient as the other unguents, except in the case of metals upon metals, in which the coefficient rises to ·10. In the case of wood on wood, black-lead is frequently used for the same purpose.

The most important fact, perhaps, and one that could hardly have been anticipated before experiment, is, *that the friction of motion is wholly independent of the velocity of the motion.*

The resistance to the motion of a wheeled carriage proceeds from two sources: the friction of the axle, and the inequalities of the road. The resistance of friction to the turning of a shaft in its bearings, or of an axle in its box has evidently the greater leverage, the thicker the journal or the axle is; the axles of wheels are accordingly made as small as is consistent with the requisite strength. The resistance that occurs between the circumference of the wheel and the road, constitutes what is called *rolling* friction. There are on all roads, to a greater or less extent, visible rigid prominences, such as small stones, in passing over which the wheel and the load resting on it have to be lifted up against gravity. But even were these absent, the hardest road yields, and allows the wheel to sink to a certain depth below its surface; so that in front of the wheel there is always an eminence or obstacle, which it is at every instant surmounting and crushing down. This is the case even on iron rails, though of course to a much less extent than on any other road. Now, for overcoming this resistance, it can be shown, on the principle of the lever, that a large wheel has the advantage over a small one; and by numerous experiments, the fact has been fully established, that on horizontal roads of uniform quality and material, *the traction varies directly as the load, and inversely as the radius of the wheel.*

The best direction of traction in a two-wheeled carriage is not parallel to the road, but at a slight inclination upward, in proportion to the depth to which the wheel sinks in the road.

On a perfectly good and level macadamized road, the fraction of a cart is found to be $\frac{1}{30}$ of the load; that is, to draw a ton, the horse requires to pull with a force equal

FRIEDLAND, 1807.

to 75 lbs. On a railway, the traction is reduced to $\frac{1}{280}$ of the load, or to 8 lbs. per ton.

While friction thus acts as an obstruction to motion, and wastes a portion of the motive-power, it has also important uses. It is, in fact, an indispensable condition, no less than gravity, in the stability of every structure, and in every mechanical motion on the earth's surface. How essential it is to our own movements, we experience when we try to walk on ice. Even on ice there is still considerable friction so that one foot can be slightly advanced before the other; were it altogether annihilated, we could not stir a fraction of an inch, even supposing that we could stand upright. Without friction a ladder could not be planted against a wall unless there were a hole in the ground to retain the foot. In short, no oblique pressure of any kind could be sustained. The advantage of railways consists chiefly in the diminution of friction but were this diminution carried much further, there could be no motion whatever, at least by means of locomotives. Without considerable friction the driving-wheels of the locomotive would slide round on the rails without advancing; and this sometimes happens, when particular states of the weather render the rails as if they were greased.

The force of friction is often directly employed in mechanics; for instance, to communicate motion by means of belts, chains, etc. Friction is the force that holds a knot. It is specially useful when a machine, with great momentum, has to be checked or arrested in its motion. The best example of this is the *break* used on railways. By means of a system of levers, blocks of wood are made to press against the circumferences of a number of the carriage-wheels; and thus the momentum of a train weighing hundreds of tons, and moving with a velocity of perhaps 50 m. an hour, is gradually destroyed in a surprisingly short time.

Friction-wheels are used to diminish the friction of axles on their supports. Two wheels, of large circumference in proportion to their weight, are placed close together, parallel to each other, and so that the one seems to overlap the half of the other; in the notch thus formed by the upper circumferences of the wheels one end of the axle rests; a similar arrangement being made for the other end. The friction, which formerly acted directly on the axle, is by this arrangement referred to the axles of the friction-wheels, and is, by the laws of mechanics, reduced in the ratio of the circumference of the friction-wheel to the circumference of its axle. In order to render the friction of the friction-wheels themselves the least possible, they are made as light and as large as is practicable.

FRIDAY, n. *frī'dā* [AS. *frige-dæg*—from *frigu*, love, the goddess of love: Icel. *frijádagr:* Gr. *frey-tag*]: sixth day of the week, supposed to have been so named from *Frigga* or *Freya*, the Saxon Venus; observed as a day of abstinence in the Rom. Cath. and other prelatical churches generally,

in memory of Christ's crucifixion. The superstition that Friday is an 'unlucky day,' which may have arisen from its association with the crucifixion, is remarkably disproved by numerous successful achievements historically recorded as occurring on that day. GOOD FRIDAY, the day observed in most Christian churches as that of our Lord's crucifixion.

FRIEDLAND, *frēd'land* or *frēt'lânt:* small town of east Prussia, in the circle of Königsberg, on the left bank of the Alle, 26 m. s. e. of Königsberg; lat. 54° 26′ n., and long. 21° e. The people are employed in linen-weaving. Friedland is famous for Napoleon's victory there 1807, June 14, over the Russian forces under Bennigsen. The Russian general found himself unable to cope successfully with an army of 80,000 men, as his own force consisted of less than 50,000 horse and foot; and he was forced to retire after a disastrous battle. He fell back on the town of Tilsit, on the Niemen, where the treaty between the French and Russian emperors and the king of Prussia, known as the treaty of Tilsit, was drawn up. Pop. 4,000.

FRIEDLAND, *frēt'lânt*, VALLENTIN, generally called, from his birthplace, *Trotzendorf:* 1490, Feb. 14—1556, Apr. 26; b. in Upper Lusatia: indisputably the greatest educationist of his age. After the death of his father, 1513, he went to Leipsic, where he studied under the celebrated Peter Mosellanus and Richard Crocus. On the dawn of the Reformation, he went to Wittenberg, where he formed a close intimacy with Luther and Melanchthon, and learned Hebrew from a converted Jew. In 1523, he went to Goldberg, in Silesia, as rector of the gymnasium there; left after four years, but returned 1531, and showed great energy in improving the organization of the school, which soon acquired a rare celebrity. Not only from Silesia, but also from Poland, Lithuania, Austria, Bohemia, Hungary, and Transylvania, pupils sought it in great numbers. Often more than 1,000 attended at a time, who all dwelt together in buildings set apart for the purpose, and were admirably superintended and drilled. Friedland had a wonderful belief in the efficacy of knowledge, and, in particular, placed so high a value on clearness of thought and expression, that he was wont to affirm that only rogues were unintelligible. See the biographies by Pinzger (1825) and Löschke (1856).

FRIEDLANDER, *frēt'lĕnt-er*, MICHAEL: Hebrew scholar; b. Introschin, Prussia, 1833, Apr. 29. He studied in Berlin with Prof. Bollermann 1851-56, then entered Berlin Univ.; also studied Hebrew theol. with Rabbis Oettinger and Rosenstein, and graduated at Halle 1862. He became director of the Berlin institute for the teaching of the Talmud, and, 1865, principal of the Jews' College. He is a member of the Soc. of Hebrew Literature, and under its auspices published *The Commentary of Ibn Esra on Jesaiah, edited from MSS. and translated with Notes, Introduction, and Glossary,* 3 vols. (London 1873-77); *The Book of Jesai-*

ah, the Anglican Version, emended according to the Commentary of Ibn Esra; The Hebrew Text of Ibn Esra's Commentary on Jesaiah, edited according to MSS. and accompanied by a Glossary, with Short Dissertations on Subjects connected with the Commentary (1874); *Essays on the Writings of Abraham Ibn Esra* (1877); *The Guide of the Perplexed of Maionides, translated from the Original Text, and Annotated* (1881); and *The Jewish Family Bible, containing the Pentateuch, the Prophets, and the Hagiographa, Hebrew and English* (1882).

FRIEDMAN, *frēd'man*, Isaac Kahn, American journalist and novelist: b. Chicago, Ill., 1870, Nov. 3. He was graduated from the University of Michigan in 1893 and has since been engaged in newspaper work in Chicago. He has published *The Lucky Number*, a collection of short stories of the Chicago slums (1896); *Poor People*, a novel (1900).

FRIEDMANN, *frēd'mân*, Alfred, German poet and novelist: b. Frankfort-on-the-Main, Prussia 1845, Oct. 26. Among his poems are: *Merlin, Orpheus* (1874), two ballads; *Biblical Stars* (1875), comprising three idylls; *Love's Fire Test Angioletta; Lays of the Heart* (1888). He is the author of many novels, including: *Two Marriages; Suddenly Rich* (1891); *The Wild Rose* (1893).

FRIEDRICH, *frēd'rĭch*, Johann: formerly a Rom. Cath. theologian, who with Dr. Döllinger (q.v) led in the formation of the Old Catholic Church; b. Franconia, Germany, 1836. He was ordained a Rom. Cath. priest 1859; became a prof. of theology at Munich 1865, and member of the Acad. of Sciences 1867. He was at the Vatican Council 1870. Subsequently he took strong ground against the modern claims of the papacy, and was excommunicated. Many of his controversial articles were published in the *Allgemeine Zeitung*. His most noted work is *Kirchengeschicte Deutschlands*. See Old Catholics.

FRIEDRICH, John, American violin-maker: b. Cassel, Germany, 1858. Having studied violin making under Oswald Möckel, he came to the United States in 1883, and shortly took prominent rank in his calling. In 1893 he obtained the highest award for violins, violas, and violoncellos at the World's Columbian Exposition. He has also made bows of very excellent workmanship, and came to be recognized as an expert in identifying and appraising rare specimens.

FRIEDRICH, Kaspar David, German painter: b. Greifswald 1774, Sep. 5; d. Dresden, 1840, May 7. He obtained his training in the Copenhagen Academy of Fine Arts, and in 1795 settled at Dresden, where he became member and professor of the Academy. He excelled in depicting nature as seen through the psychologic medium of transitory human moods. Favorite motifs are the gloom of the forest, night scenes with moonlight, or storms at sea. The Castle of Berlin contains two fine examples: *Abbey in an Oak Forest on a Winter's Evening*, and *Pilgrim on the Shore*.

FRIEND, n. *frĕnd* [Goth. *frijonds*, a friend—from *frijon*, to love: Ger. *freund*, a friend: AS. *freond*—from *freon*, to free, to love]: one attached to another by sentiments of affection, esteem, or respect; one not hostile; an associate; a term of respectful salutation or address, as 'my friends': V. to become a friend; to befriend. FRIEND'LIKE, a. FRIEND'LESS, a. without a friend. FRIEND'LESSNESS, n. FRIEND'LY, a. *-lĭ*, disposed to, as a friend; amicable; favorable: AD. after the manner of a friend; amicably; in union. FRIEND'LINESS, n. a disposition to favor or befriend; good-will. FRIEND'SHIP, n. intimacy or attachment depending on mutual respect and esteem; personal kindness; friendly aid. FRIENDS, the religious body or society usually called Quakers (see FRIENDS, SOCIETY OF). A FRIEND AT COURT, one who has ability or interest to serve us.—SYN. of 'friendly, a.': kind; propitious, conciliatory.

FRIEND'LY ISL'ANDS (as distinguished from the Fiji Islands (q.v.), which are generally reckoned a part of them), otherwise styled the TONGA GROUP: islands s.e. of Fiji. They consist of three sub-groups, of which about 30 islands are inhabited, Tonga-tabu being the largest. The great majority are of coral formation; but some are volcanic, and there are several active volcanoes. The people are the most intelligent and skilful of the fair Polynesians, but are decreasing in numbers. A treaty with Germany 1876 granted that empire a coaling-station; and a treaty with Great Britain was concluded 1879. The Friendly Islands were discovered by Tasman 1643, but received their collective name from Cook. Both these navigators found the soil closely and highly cultivated, and the people apparently unprovided with arms. The climate is salubrious, but humid; earthquakes and hurricanes are frequent, but the former are not destructive. Among the products of the islands are yams, sweet-potatoes, bananas, cocoa-nuts, bread-fruit, sugar-cane, the *ti*, hog-plum, etc.; some corn also is grown. The Flora resembles that of the Fiji group but the native animals are very few.

The Friendly Islands were visited by missionaries first in 1797. In 1827 the work of evangelization fell into the hands of the Wesleyan Methodists, and after a lengthened and perilous struggle with the savage paganism of the inhabitants, it achieved success. Almost all the islanders now are Christians; great numbers can speak English, and, in addition, have learned writing, arithmetic, and geography; while the women have been taught to sew. The various islands were governed formerly by independent chiefs, but nearly all are now under the rule of one chief, called King George, who is not only a Christian, but a zealous preacher of the gospel. Pop., formerly reckoned at 40,000, is now about 10,000.

FRIEND'LY SOCI'ETIES: associations, usually among operatives, for relief of the members in illness or in lack of work. Trades-Unions (q.v.) also have such relief as one of their objects, but their chief feature is combination against oppression which is felt or feared from capital.

FRIENDLY SOCIETIES.

Friendly Societies had their prototypes in the cases, boxes, and chests, or kists—as they were called in Scotland and Germany—of the guilds and corporations of medieval Europe; which were funds not only for maintaining the dignity and ministering to the conviviality of society, but were accumulated to provide for the aged and the sick. Mr. Turner finds them in Anglo-Saxon England, and, like the other institutions connected with municipal life, they probably formed part of the legacy of the Romans to the Teutonic conquerors of Europe. Friendly Societies are a form of mutual insurance, and, like all insurances, they depend on the principle of substituting the certainty which attends the fortunes of large numbers of men for the uncertainty which belongs to the fortune of each. Their main objects are the securing, in virtue of a small periodical payment during health and vigor, of a weekly sum during sickness, a sum to cover funeral expenses at death, and sometimes of a pension after a certain age. In some respects, therefore joining a friendly society is better than becoming a depositor in a savings-bank. Sickness may come before the savings are considerable; or, if considerable, they may be melted away by a long-continued sickness; but after the first weekly payment is made to a friendly society, the member is secure of succor, at least for a time, and he has, perhaps, other advantages. It is possible, on the other hand, that a member may find difficulty in certain circumstances, in keeping up the weekly or other periodical payments required, and in this case, in most societies, he altogether forfeits the expected benefits.

It is to be regretted that, of this excellent class of institutions, many are founded on erroneous principles, or rather on no principles at all; and it often happens, therefore, that those who trust to them are disappointed, the funds falling short before all claims are satisfied. In former years no proper calculations for Friendly Societies existed; but sound calculations are now attainable on the average amount of sickness incident to human life—based on investigation of a large number of cases through a considerable term of years. An English estimate of high repute is that by Mr. Neison, of 'sickness experienced in *weeks* in passing through different periods of life': age 20-30 years, 8·7; 30-40, 9·9; printed by order of the house of commons for 1856, 7; and the latter, with a masterly essay on the mathematical treatment of the subject, are contained in the 12th report of the registrar-general.

We have an idea of a friendly society in its simplest form, if we suppose a hundred men of 35 years of age, to associate, and make such a payment at first as may be sure to afford each man that shall fall sick during the ensuing year a half-dollar a day during his sickness. Taking, for illustration, Mr. Neison's Tables, we find that, among such a body of men, there will be nearly 100 weeks of illness in the course of the year. This, multiplied by 7, gives the whole sum required, $350, or $3.50 from each member, which, less

by a small sum for interest, will accordingly be the entry-money of each man. A society of individuals of different ages, each paying the sum which would in like manner be found proper to his age, would be quite as sound in principle as one on the above simple scheme. It is only a step further to equalize each man's annual payments over the whole period during which he undertakes to be a paying member.

A point for consideration is the investment and improvement of the funds of a society. In many cases, it is best to rest content with depositing the money in the public funds or the savings-banks, this ensuring at least a moderate interest. Some of the societies have sums invested with the commissioners for the reduction of the national debt. But circumstances may warrant an investment with local building societies, or in corporation debentures, or in other ways which afford a better rate of interest with safety; and the tendency to abandon the old routine of merely savings-bank deposit seems generally growing. See BUILDING SOCIETIES; CO-OPERATION; TRADES UNIONS.

FRIENDLY SONS OF SAINT PATRICK, Philadelphia, Pa., organized in 1790 as the Hibernian Society. The first president was Hon. Thomas McKean, a signer of the Declaration of Independence. Among other prominent members of the society have been Gen. Walter Stewart, Commodore John Barry, Gen. Edward Hand, Col. Francis Nichols, Col. Thomas Proctor, Hon. Thomas Fitz Simons, and Gen. Andrew Jackson. The organization still exists, has a membership of over 600, and has in its treasury $75,000 or $80,000. In December 1897 the name Hibernian Society was dropped and that of the Friendly Sons of Saint Patrick adopted. The latter name had been borne by a Philadelphia society which was organized in 1771 and went out of existence sometime after 1805.

FRIENDLY SONS OF SAINT PATRICK, SOCIETY OF THE, New York city; founded in 1784. Today, as at all times during its long existence, it numbers in its membership a great many of the most eminent merchants and professional men of New York. Among its presidents have been Hon. Richard O'Gorman, Chief Justice Charles P. Daly, Hon. James T. Brady, Eugene Kelly, Hon. Hugh J. Hastings, Joseph J. O'Donohue, David McClure, Samuel Sloan, John D. Crimmins, Hon. Morgan J. O'Brien, Hon. James A. O'Gorman, and Hon. James Fitzgerald. There are no creed or political tests for membership in the organization.

FRIENDS, *frĕndz*, SOCIETY OF: proper designation of a sect of Christians, better known as Quakers; founded by George Fox (q.v.). In spite of severe and cruel persecutions, the Society of Friends succeeded in establishing themselves both in England and in America. Their founders were not open to the charge of fanaticism; but a few of the early followers of the doctrine, were, as in other companies newly gathered, persons of unbalanced minds, who

roused popular indignation by unseemly antagonism to almost all usages in church and state—not seldom carrying their opposition to the point of serious disturbance of the public peace, and to a defiance of authority and an actual courting of martyrdom. This line of action gave occasion, though not any excuse, to the persecution of a few members of this sect in the early Massachusetts history. But though the great body of the Friends were pure and calm and Christian, while unyielding, they suffered severe persecution in Britain, where (1650-89) 14,000 were fined and imprisoned, and 369 died in jail. After the date mentioned the persecution ceased in Britain and America. The Friends have never been numerically powerful (having at no time exceeded 200,000 members in all lands); but the purity of life which from the beginning has honorably distinguished them as a class, has unquestionably had a salutary influence on the public at large; while in respect to certain great questions affecting the interests of mankind, such as *war* and *slavery*, they have, beyond all doubt, originated opinions and tendencies which, whether sound or erroneous, have widely leavened the mind of Christendom. For an account of the more eminent representatives of the Friends, see BARCLAY; FOX; PENN; etc. Their doctrine, practice, and discipline, as laid down in their own publications, is summarized as follows.

1. *Doctrine.*—It is perhaps more in the *spirit* than in the *letter* of their faith that the Society of Friends differ from other Christians. They themselves (excepting a portion who hold a general Unitarian view) assert their belief in the great fundamental facts of Christianity, and even in the substantial identity of most of the doctrinal opinions which they hold with those of the evangelical denominations. The Epistle addressed by George Fox and other Friends to the gov. of Barbadoes, 1673, contains a confession of faith not differing materially from the so-called Apostles' Creed, except that it is more copiously worded, and dwells with great diffuseness on the internal work of Christ. The Declaration of Christian Doctrine on behalf of the Society 1693, expresses a belief in what is usually termed the Trinity, in the atonement made by Christ for sin, in the resurrection from the dead, and in the doctrine of a final and eternal judgment; and the Declaratory Minute of the yearly meeting 1829 asserts the inspiration and divine authority of the Old and New Testament, the depravity of human nature consequent on the fall of Adam, and other characteristic doctrines of Christian orthodoxy, adding: 'Our religious Society from its earliest establishment to the present day, has received these most important doctrines of Holy Scripture in their plain and obvious acceptation.' It is nevertheless certain that uniformity of theological opinion cannot be predicated of the Friends, any more than of other bodies of Christians. As early as 1668, William Penn and George Whitehead held a public discussion with a clergyman of the English Church, named Vincent, in which they

maintained that the doctrine of a tri-personal God, in the form held by that church was not found in the Scriptures, though in what form they accepted the doctrine themselves does not appear; and some time later, Penn published the *Sandy Foundation Shaken*, in which, among other things, he endeavored to show that the doctrines of vicarious atonement and of imputed righteousness did not rest on any scriptural foundation. But in general, the Society of Friends, in the expression of their belief, have avoided the technical phraseology of other Christian churches, restricting themselves with commendable modesty to the words of Scripture itself, as far as that is possible, and avoiding, in particular, the knotty points of Calvinistic divinity (see Barclay's *Catechism and Confession of Faith* (1673), in which the answers to the questions—to avoid theological dogmatism—are taken from the Bible itself). This habit of allowing to each individual the full freedom of the Scriptures, has, of course, rendered it all the more difficult to ascertain to what extent individual minds, among the Society, may have differed in their mode of apprehending and dogmatically explaining the facts of Christianity. Their principal distinguishing doctrine is that of the 'Light of Christ in man,' on which many of their outward peculiarities, as a religious body, are grounded. The doctrine of the internal light is founded on the view of Christ given by the apostle John, who, in the first chapter of his gospel, describes Christ—the Eternal Logos—as the 'life' and 'light of men,' 'the true light,' 'the light that lighteth every man that cometh into the world,' etc. Barclay taught that even the heathen were illumined by this light, though they might not know—as, indeed, those who lived before Christ *could* not know—the historical Jesus in whom Christians believe. In their case, Christ was the light shining in darkness, though the darkness comprehended it not. The existence of 'natural virtue' (as orthodox theologians were used to term it) among the heathen was denied by Barclay, who regarded all such virtue as Christian in its essence, and as proceeding from the light of Christ shining through the darkness of pagan superstition. These opinions seem to be somewhat freer than those expressed in the General Epistle of the Society in England (1836), wherein they refuse to acknowledge 'any principle of spiritual light, life, or holiness inherent by nature in the mind of man,' and again assert, that they 'believe in no principle whatsoever of spiritual light, life, or holiness, except the influence of the Holy Spirit of God bestowed on mankind in various measures and degrees through Jesus Christ our Lord;' but, on the other hand, in a little treatise published by the Society 1861, it is affirmed that 'the Holy Spirit has always been afforded in various measures to mankind;' while stress is laid on the statement of the apostle Paul, that 'the grace of God (understood by Friends to signify the 'operation of the Divine Spirit') that bringeth salvation, *hath appeared to all men;*' while another exponent of their views, T. Evans of Phila-

delphia (see *Cyclopædia of Religious Denominations*, Lond. Griffin & Co. 1853), states that 'God hath granted to all men, of whatsoever nation or country, a day or time of visitation, during which it is possible for them to partake of the benefits of Christ's death, and be saved. For this end, he hath communicated to every man a measure of the light of his own Son, a measure of grace, or the Holy Spirit, by which he invites, calls, exhorts, and strives with every man, in order to save him; which light or grace, as it is received, and not resisted, works the salvation of all, even of those who are ignorant of Adam's fall, and of the death and sufferings of Christ; both by bringing them to a sense of their own misery, and to be sharers in the sufferings of Christ inwardly; and by making them partakers of his resurrection, in becoming holy, pure, and righteous, and recovered out of their sins.' Hence it may be safely asserted that they hold a broader view of the Spirit's working than has, till recently, been held largely or definitely by any other Christian denomination.

In America, about 1827, Elias Hicks, a Friend of remarkable powers, made a schism in the Society, by the promulgation of opinions denying the miraculous conception, divinity, and atonement of Christ, and the authenticity and divine authority of the Holy Scriptures. About one-half of the society in America adopted the views of Hicks, and are known as Hicksite Friends; their opinions, of course, are repudiated by the rest of the Society, who are sometimes described as Orthodox (better, Evangelical) Friends. The Hicksite schism thoroughly alarmed the evangelical party both in England and America; and a movement was begun in favor of education, of a doctrinal belief more nearly allied to that of the so-called 'Evangelical' churches, and of a relaxation in the formality and discipline of the Society. The leader of this movement was Joseph John Gurney, of Norwich, England. This new tendency, however, excited—by its influence toward weakening the formal bonds of the Society—considerable opposition among some of the Friends in America; and the consequence was a division among the Evangelical Friends themselves, and the formation of a new sect, called 'Wilburites,' after the name of their founder, John Wilbur, who are noted for the strictness with which they maintain the traditions and peculiarities of the Society. (See *Friendly Sketches in America*, by William Tallack. Lond., Bennett 1862.) Some slight indications of theological differences have manifested themselves in England also.

2. *Practice.*—It is in the application of their leading doctrine of the 'internal light' that the peculiarities of the Friends are most apparent. Believing that it is the Holy Spirit, or the indwelling Christ of God, that alone maketh wise unto salvation, illumining the mind with true and spiritual knowledge of the deep things of God, they do not consider 'human learning' essential to a minister of the gospel, and look with distrust on the method adopted by various churches for obtaining such—viz., by formally

training after a human fashion a body of youths chosen without evidence of a clear inward call of God. They believe that the call to this work now, as of old, is 'not of men, neither by man, but by Jesus Christ, and God the Father;' and that it is bestowed irrespectively of rank, talent, learning, or sex. Consequently, they have no theological halls, professors of divinity, or classes for 'students.' Further, as fitness for the ministry is held to be a free gift of God through the Holy Spirit, so, they argue, it ought to be freely bestowed, in support of which they adduce the precept of the Saviour—'Freely ye have received, freely give;' hence those who minister among them are not paid for their labor of love, but, on the other hand, whenever such are engaged from home in the work of the gospel, they are, in the spirit of Christian love, freely entertained, and have all their wants supplied; in short, the Friends maintain the absolutely voluntary character of obligations to religious services in public, as being properly performed only under an immediate impression of duty; and that Christians should do all for love and nothing for money. It also follows from their view of a call to the work of the ministry, that women may exhort as well as men, for the 'spirit of Christ' may move them as powerfully as the other sex. The prophecy of Joel as applied by Peter is cited as authority for the preaching of women: 'On my servants and on my handmaidens I will pour out in those days of my spirit, and they shall prophesy.' They adduce also the New Testament examples of Tryphæna, Gryphosa, the beloved Persis, and other women who appear to have labored in the Gospel. Their mode of conducting public worship likewise illustrates the entireness of their dependence on the 'internal light.' In other religious bodies, the minister has a set *form* of worship, through which he must go, whether he feels devoutly disposed or not. This seems objectionable to the Friends, who meet and remain in silence until they believe themselves moved to speak by the Holy Spirit. Their prayers and praises are, for the most part, silent and inward. They prefer to make melody in their hearts unto God, considering this to be more spiritual than the outward service of the voice.

The doctrine of the 'internal light' has led the Friends also to reject the ordinances of Baptism and the Lord's Supper in the form observed by other Christians. They believe the Christian baptism to be a spiritual one, and not with water, like the Jewish and heathen baptisms; in support of which they quote, among other passages, the words of John the Baptist himself: 'I baptize you with water, but there cometh one after me who shall baptize you with the Holy Spirit and with fire.' Similarly do they regard the rite of the Lord's Supper: It is, say they, inward and spiritual, and consists not in any symbolic breaking of bread and drinking of wine, but in that daily communion with Christ through the Holy Spirit, and through the obedience of faith, by which the believer is nourished and strengthened. They believe that the last words of the

dying Redeemer on the cross, 'It is finished,' announced the entire abolition of symbolic rites; that under the new spiritual dispensation then introduced, the necessity for rites as a means of arriving at truth or of offering worship, ceased, and that their place has been abundantly supplied by the Comforter, the Holy Spirit, whose office it now is to lead and guide men into all truth. The true Christian supper, according to them, is set forth in the Book of Revelation—'Behold I stand at the door and knock; if any man hear my voice and open the door, I will come in unto him, and will sup with him and he with me.' For the same reason—viz., that the teaching of the Spirit is inward and spiritual—the Friends ignore the religious observance of days and times, though some at least among them regard the Lord's Day, known often as the Sabbath, of perpetual obligation.

The taking or administering of oaths is regarded by Friends as inconsistent with the command of Christ, 'swear not at all,' and with the exhortation of the apostle James—'Above all things my brethren, swear not, neither by heaven, neither by the earth, neither by an other oath; but let your yea be yea; and your nay, nay; lest ye fall into condemnation.' They have refused also to pay tithes in Britain for the maintenance of what they hold to be a hireling ministry, believing that Christ put an end to the priesthood and ceremonial usages instituted under the Mosaic dispensation, and that he substituted none in their place but left men to the inward work of His Spirit. In consequence all consistent Friends in Britain have been regularly mulcted of plate, furniture, or other goods, to the value of the amount due. The recent conversion of tithe into *rent-charge*, however, has, in the opinion of many Friends, largely removed objections to the payment to this ecclesiastical demand. In regard to the civil magistracy, while they respect and honor it, as ordained of God, they are careful to warn the members of their Society against thoughtlessly entering on its responsibilities, involving as it does the administration of oaths, the issuing of orders and warrants in reference to ecclesiastical demands, the calling out of an armed force in cases of civil commotion, and other duties inconsistent with the peaceful principles of the Society. The Friends have likewise consistently protested against war in all its forms; and the Society has repeatedly advised its members against aiding and assisting in the conveyance of soldiers, their baggage, arms, ammunition, or military stores. They regard the profession of arms and fighting, not only as diametrically opposed to the general spirit of Christ, whose advent was sung by angels in the words: 'Glory to God in the highest, and on earth peace, good-will toward men;' but as positively forbidden by such precepts as—'Love your enemies, bless them that curse you, do good to them that hate you, and pray for them which despitefully use you and persecute you;' also, 'Resist not evil; but whosoever shall smite thee on the right cheek, turn to him the other also;' and

while they acknowledge that temporary calamities may result from adopting this principle of non-resistance, they have so strong a faith in its being essentially the dictate of divine love to the Christian heart, that they believe God, by his wise and omnipotent providence, could, and will yet make it 'mighty to the pulling down of the strong-holds of iniquity.' The world, they believe, will by and by confess that the peace-makers are most truly the children of God. The efforts of the Society for the emancipation of the slaves are a part of modern history in Britain and the United States. They may certainly claim to have cultivated the moral sense of their follow countrymen on this important question. As early as 1727, they began to 'censure' the traffic in slaves, as a practice 'neither commendable nor allowed,' and gradually warmed in their opposition, until the whole British nation felt the glow, and entered with enthusiasm on the work of abolition. In respect to what may be called minor points also, the Friends are very scrupulous; they object to 'balls, gaming-places, horse-races, and playhouses, those nurseries of debauchery and wickedness, the burden and grief of the sober part of other societies as well as of our own.' The Printed Epistle of the British yearly meeting 1854 contains a warning against indulging in music, especially what goes by the name of 'sacred music', and denounces musical exhibitions, such as oratorios, as essentially a 'profanation'—the tendency of these things being, it is alleged, 'to withdraw the soul from that quiet, humble, and retired frame in which prayer and praise may be truly offered with the spirit and with the understanding also.' They object, besides, to 'the hurtful tendency of reading plays, romances, novels, and other pernicious books;' and the yearly meeting 1764 'recommends to every member of our Society to discourage and suppress the same.' A similar recommendation was issued by the Society 1851 for the benefit of 'younger Friends' in particular, who appear to have been eating the forbidden fruit. The printed Epistle of the yearly meeting 1724 likewise 'advise against imitating the vain custom of wearing or giving mourning, and all extravagant expenses about the interment of the dead,' and this advice has been repeatedly renewed. A multitude of other minute peculiarities distinguish the Friends from their fellow-Christians.

3. *Discipline.*—By the term discipline the Friends understand 'all those arrangements and regulations which are instituted for the civil and religious benefit of a Christian church.' The necessity for such discipline soon began to make itself felt, and the result was the institution of certain meetings or assemblies. These are four in number: first, *Preparative* meetings; second, *Monthly* meetings; third, *Quarterly* meetings; fourth *Yearly* meetings. The first are usually composed of the members in any given place, in which there are generally two or more Friends of each sex, whose duty is to act as overseers of the meeting, taking cognizance of births, marriages, burials, removals, etc., the

conduct of members, etc., and reporting thereon to the monthly meetings, to whom the executive department of the discipline is chiefly confided. The monthly meetings decide in cases of violation of discipline, and have the power of cutting off or declaring 'not in union,' all who by their improper conduct, false doctrines, or other gross errors, bring reproach on the Society, though the accused have the right of appeal to the quarterly meetings, and from these again to the yearly, whose decisions are final. The monthly meetings are empowered also to approve and acknowledge ministers, as well as to appoint 'serious, discreet, and judicious Friends, who are not ministers, tenderly to encourage and help young ministers, and advise others, as they, in the wisdom of God, see occasion': they execute a variety of other important duties. The quarterly meetings are composed of several monthly meetings, and exercise a sort of general supervision over the latter, from which they receive reports, and to which they give such advice and decisions as they think right. The yearly meeting consists of select or representative members of the quarterly meetings. Its function is to consider generally the entire condition of the Society in all aspects. It receives in writing answers to questions that it has previously addressed to the subordinate meetings, deliberates upon them, and legislates accordingly. To it exclusively the legislative power belongs. Though thus constituted somewhat according to Presb. order, yet any member of the Society may attend and take part in the proceedings.

Women have also a special sphere of discipline allotted to them: they inspect and relieve the wants of the poor of their own sex, take cognizance of proposals for marriage with advice to those concerned, deal with female delinquents privately, and under certain restrictions may even do so officially, though in the 'testimony of disownment,' they have always the assistance of members of the other sex.

The Society of Friends, in the multitude of its regulations, has not forgotten the poor; charity in its narrower, as well as in its broader sense, has always been a beautiful feature of its members. No brighter names than some of those in this Society are found on the list of great benefactors of the race; and a constant and quiet charity flows from their hands. The care of the poor was one of the earliest evidences which Christianity afforded to the Gentiles of the superiority and divine character of its principles; and it is honorable to the Society that a similar provision for those united to them in religious fellowship appears to have been one of the earliest occasions of their meetings for discipline. Nevertheless, in accordance with their ruling principle, that all Christian duty should be left for its fulfilment to the spontaneity of Christian love, and not performed under compulsion of any kind, 'the provision for the poor is purely voluntary; yet their liberality is proverbial throughout Britain and America.

The former stringency of law against certain peculiari-

ties has been almost entirely relaxed. Instead of taking the oath in court or at entrance on a civil office, they are allowed to make a solemn affirmation, though with the same penalty as for perjury in case of wilful falsehood. In Britain compulsory church-rates have so largely been abolished as to give Friends practical liberation in that particular.

In 1906 the Friends in the U. S. were divided into four bodies, viz.: Orthodox, who had 830 churches, 96,170 members, and church property valued at about $3,000,000; Hicksite, 183 churches, 19,545 members, and church property about $1,700,000; Wilburite, 53 churches, 4,468 members, and church property about $70,000; and the Primitive, 9 churches, 232 members, and church property $17,000—total churches 1,075, members 120,415, and value of church property about $4,800,000.

FRIENDS OF GOD: brotherhood of mystics, having centres in Cologne, Strasburg, and Basle in the 14th c. They never organized themselves into a sect, were regular in their attendance at church services and in the observance of established church rules; but, protesting against the corruptions of the times, attempted to reform ecclesiastical practices, and set an example of holy living. Nicholas of Basle was their great leader and martyr, John Tauler their chief preacher, and the Dominicans principally their teachers.

FRIES, *frēs*, Elias Magnus: 1794, Aug. 15—1878, Feb. 8; b. in the dist. of Femsjö, Sweden: naturalist. He studied at Lund, where he taught botany 1828. In 1834, he was called to the Univ. of Upsala, as prof. of practical economics, with which, 1851, the chair of botany was conjoined. Fries's researches embrace the entire field of botany, *phanerogamous* as well as *cryptogamous* plants, and he was the first to introduce into Sweden the morphological theory, the basis of which is in his *Systema Orbis Vegetabilis* (Lund 1825). His earliest important work was *Observationes Mycologicæ* (2 vols. Copen. 1815–18). This was followed by *Systema Mycologicum* (3 vols. Greifsw. 1821–29; Supp. 1830), completed in *Elenchus Fungorum* (2 vols. Greifsw. 1828) and in *Novæ Symbolæ Mycologicæ* (Upsala 1851). For another department of cryptogamic botany, the lichens, Fries did great service by his *Lichenographia Europæa Reformata* (Lund and Greifsw. 1831). Among his monographs *Symbolæ ad Historiam Hieraciorum* (Upsala 1848) deserves especial mention. He wrote a number of works on the *Flora* of Scandinavia, and his *Summa Vegetabilium Scandinaviæ* (Upsala 1846 *et seq.*) is one of his best productions. His *Herbarium Normale* (Upsa' 1847), collected at great expense, and with incredible dustry, contains dried specimens of all the rarest pla , of Scandinavia. In 1851 he was appointed directo of the Botanical Museum and Garden attached to the Univ. of Upsala, and in 1853 rector of the university; and, 1859, retired from work.

FRIES. Jakob Friedrich: 1773, Aug. 23–1843. Aug

10; b. Barby, Prussian Saxony: founder of a philosophic school in Germany. He studied at Leipsic and Jena, and in 1805 went to Heidelberg, as prof. of philosophy and mathematics. In 1816 he accepted a call to the chair of speculative philosophy at Jena, but was deprived of his professorship, for his participation in certain democratic disturbances 1819. In 1824 he was appointed to the chair of physics and mathematics, which he occupied till his death. Fries' writings are very numerous. Some of the more important are *System der Philosophie als evidente Wissenschaft* (Leip. 1804); *Neue oder anthropologische Kritik der Vernunft* (3 vols. Heidelb. 1807; 2d ed., 1828–31); *System der Logik* (Heidelb. 1811; 3d ed., 1837); *Handbuch der physischen Anthropologie* (2 vols., Jena 1820–1; 2d ed., 1837–39); *Die Lehren der Liebe, des Glaubens, und der Hoffnung* (Heidelb. 1823); and *Geschichte der Philosophie* (2 vols. Halle 1837–40). In his philosophy, Fries followed the method of Kant, but believing that method incomplete, he sought to supplement by an analytical nature-doctrine (*analytischen-naturlehre*) of the human soul, which he designated philosophic anthropology. His *Glaubenslehre*, or Doctrine of Faith, by which he hoped to repair the ravages which the critical philosophy had made upon the certainty of our knowledge, resembles, in some respects, Jacobi's doctrine of the Intuition of the Pure Reason. De Wette adopted it as the basis of his religious philosophy. Some of his disciples, Apelt, Schleiden, Schlömilch, Friedrich Francke, and Schmidt, published at Leipsic in 1848–9, several philosophic papers, entitled *Abhandlungen der Fries' schen Schule.*

FRIES, John, American insurgent: b. 1764; d. 1825. When in July 1798, Congress voted a direct tax of $2,000,000 the federal officers who were sent to Pennsylvania to collect the State quota of $237,000, were resisted by a party of opposition which Fries had rallied from among the Germans of Montgomery, Lehigh, Bucks and Berks counties. At Bethlehem 1799, March 7, the United States marshal was compelled by this party to release 30 prisoners who had been arrested for refusing to obey the law. The 'rebellion' was at length put down by the militia which President Adams ordered out, and among those captured was Fries, who was subsequently twice tried and on each occasion sentenced to death. In April, 1800, he was pardoned by President Adams, who at the same time proclaimed an amnesty to all concerned in the 'rebellion'.

FRIESE, *frē'zė*, Richard, German painter: b. Gumbinnen, East Prussia, 1854, Dec. 15. He studied at Berlin, and traveled in the East, as well as northward within the Arctic Circle. He is now considered one of the best of German animal painters, and is equally successful in depicting the lion in the desert and the deer in a German forest. In 1886 he was awarded a gold medal by the Berlin Academy, of which body he was elected a member in 1892. His most famous works are: *Lions Surprising a Sleeping Caravan* (1884), in the Dresden Gallery; *On the Bredszell Moor* (1895), in the Königsberg Museum.

FRIESLAND, *frēz'land*, or VRIESLAND, *frēs'lânt* (ancient *Frisia*): one of the most northern and one of the most wealthy provinces of the Netherlands; between 52° 40′—53° 30′ n. lat. and 5° 30′—6° 20′ e. long.: bounded n. by the German Ocean, w. and s.w. by the Zuyder Zee. It is sometimes called WEST FRIESLAND to distinguish it from EAST FRIESLAND, now a part of the Prussian province of Hanover (see below). The three divisions of Friesland are Leeuwarden, Heerenveen, and Sneek. There is a large import and export trade especially with England. The exports to England include potatoes, oats, butter, and cheese. The land is flat, in some parts below the level of the sea, and is intersected by canals and streams. Lakes and marshes are numerous. The dikes, sluices, and canals are under the care of a special board, and are kept up at the local expense. The inland waters abound with fish. Rich pastures, well suited for horses, cattle, sheep, and pigs, cover a third part of the surface. Large quantities of peat are made. The land products are chiefly wheat, rye, barley, oats, buckwheat, beans, peas, potatoes, colza, flax, etc. Friesland is well supplied with schools and charitable institutions. A sixth part of the population is at school. The capital is Leeuwarden (q.v.). Schiermonnikoog and Ameland carry on extensive fishing for cod, haddock, sole turbot, etc. Pop. (1901) 345,004.

EAST FRIESLAND, 53° 8′—53° 40′ n. lat., and 6° 50′–8° e. long., has nearly 1,200 sq. m. It now forms the Hanoverian dist. of Aurich; chief towns, Emden and Aurich. It is bounded n. by the German Ocean, w. by the Netherlands, s. by Aremberg and e. by Oldenburg. Like Netherlands, Friesland, East Friesland is low and flat, requiring the protection of dikes and sluices. Fishing and agriculture are the chief employment of the inhabitants, descendants of the ancient Frisians. This province has frequently changed owners since 1744, when the family of Zirksena, in whose possession it had been for 300 years, became extinct. It was first ceded to Prussia, next incorporated by Napoleon with Holland and France; 1814 it was restored to Prussia; 1815 it was ceded to Hanover, with which it again forms part of Prussia. Pop. estimated at 336,000.

FRIEZE, n. *frēz* [F. *friser*, to curl or crisp; *frisons*, frizzled or raised work: Sp. *fres*, gold or silver lace: mid. L. *frisārĕ*, to ornament with borders]: a kind of coarse woolen cloth with a nap on one side: [F. *frise*; Sp. *friso*; OF. *frize*, a frieze]: in *classical arch.*, the flat part under the cornice of a column, usually ornamented with figures or other carved work; the central portion of the entablature; called by Vitruvius, the *Zophorus* (life-bearing), as being usually ornamented with sculptured figures: also any enriched horizontal band: V. to form a nap; to frizzle; to curl, FRIEZED, a. *frēzd*, napped; shaggy. FRIEZELIKE, a. FRIEZ'ING, n. the process of forming a nap on woolen cloth. *Note.*—FRIEZE, a coarse, shaggy cloth, by a false etymology, aris-

ing from a similarity in sound, is supposed to have come from *Friesland.* By a similar etymological blunder, *frizzled hen* is called *Friesland hen.* Littré and Brachet both derive *frieze* from *Friesland.*

FRIEZE, Henry Simmons, American educator: b. Boston 1817, Sep. 15; d. Ann Arbor, Mich., 1889, Dec. 7. He was graduated from Brown University in 1841, was instructor there from 1841-5, and in the grammar-school connected with the university 1845-54, and from 1854 professor of the Latin language and literature in the University of Michigan, of which in 1869-71 and 1880-1 he was the acting president. He did much to promote the interests of the university, obtaining for it a State appropriation of $75,000 and an important library in political science. He published an edition (1860) of the *Æneid,* and (1867) of the *Ars Rhetorica* and *The Story of Giovanni Dupré* (1886).

FRIGA, or Frigga. See Freyja.

FRIGATE, n. *frĭg′āt* [F. *frégate*—from It. *fregata* or Sp. *fragata,* a light row-boat; prob. connected with Goth. *fargod,* a row-galley; also with Lat. *aphractus,* undecked galley]: war-ship, generally carrying 20-50 guns, it was formerly a long narrow vessel propelled by oars and sails, used in the Mediterranean when speed was requisite. The name then came to be applied to men of war, of a class smaller than line-of-battle ships, and carrying from 20 to 50 guns, which were employed in the great wars of the 18th, and early part of the 19th c., as scouts and cruisers. The frigate, usually swift, easily managed, and capable of beating well up to the wind, became the favorite ship in war-time, and bore off a large proportion of the prize-money. Frigates served to obtain information as to the movements of hostile fleets, and to guide the sailing of their own; but it was unusual for them to join in the line of battle their exploits ordinarily occurring in engagements with single ships of their own class. One of Nelson's frequent complaints was, that he had not a larger number of swift frigates to intercept the enemy's cruisers; it having then been notorious that the French built faster and finer craft than the British dockyards could turn out, though it must be added, that most of these rapid frigates had changed their flag before the war closed. With steam, and the growth of fleets in later times, frigates were developed more than any other men-of-war, and many of the largest ships in the navy belonged to this class; such as the *Diadem, Mersey Orlando,* and the iron plated *Warrior,* of 6,000 tons, three times the burden of any ship of the line in Nelson's fleet. Now, however, these are all ships of the past, incapable of contending with all the armored monsters which carry modern artillery.

FRIG′ATE BIRD, or Man-of-war Bird, *Tachypetes aquilus,* or *Fregata aquilus:* bird of the Pelican family (*Pelecanidæ*), the only well-ascertained species of its genus,

allied to the Cormorants. It is a large bird with black plumage, sometimes measuring 10 ft.—some say even 14 ft.—from tip to tip of extended wings. It is a bird of very powerful and rapid flight, and there seems to be good reason for believing that it can remain on wing for days together. It inhabits the intertropical coasts of the Atlantic and Pacific Oceans, often flying far out to sea, but returning. Its aerial evolutions are extremely graceful, and it soars to a great height. It is said never to dive for its prey, but to seize fishes only when they appear at the surface or above it. Flying fishes constitute much of its food.

FRIGATOON, n. *frĭg-a-tôn′* [It. *fregatone*]: Venetian vessel with a square stern, and only two masts.

FRIGHT, n. *frīt* [Goth. *faurhts*, timid: AS. *forht;* Ger. *furcht;* Sw. *frukta*, fear: AS. *frihtan*, to terrify]: sudden terror of short duration; alarm. FRIGHTFUL, a. *frīt′fûl*, exciting alarm or terror; shocking. FRIGHT′FULLY, ad. *-lĭ*. FRIGHT′FULNESS, n. state of being frightful; the power of impressing sudden fear. FRIGHT, v. *frīt*, or FRIGHTEN, v. *frīt′n*, to alarm suddenly; to terrify; to dismay. FRIGHTENING, imp. *frīt′nĭng*. FRIGHTENED, pp. *frīt′nd*.—SYN. of 'fright, n.': terror; consternation; fear;—of 'fright, v.': to scare; affright; daunt; intimidate;—of 'frightful'; dreadful; alarming; fearful; terrible; terrific; horrid; horrible; awful.

FRIGID, a. *frĭj′ĭd* [L. *frigĭdŭs*, cold: It. *frigido:* F. *froid*]: cold; without warmth; without affection; formal; lifeless. FRIG′IDLY, ad. *-lĭ*. FRIG′IDNESS, n. FRIGIDITY, n. *frĭ-jĭd′ĭ-tĭ*, coldness; want of warmth; coldness of affection. FRIGID ZONES, the belts of the earth's surface which lie between the poles and the polar circles, 23½° from each pole. FRIGORIFIC, a. *frĭg′ŏ-rĭf′ĭk* [L. *facĭō*, I make]: that produces cold.

FRILL, n. *frĭl* [W. *ffrill*, to twitter, to chatter: F. *friller*, to shiver for cold: comp. Gael. *frith*, small; *fill*, plait]: a plaited band to a garment; a ruffle: V. to attach a frill to; to ruffle with cold, as a hawk her feathers. FRIL′LING, imp.: N. the ruffles or plaited bands of a garment. FRILLED pp. *frĭld*. *Note.*—The connection is imitative of a twittering sound, a shivering vibratory motion, and then a curly or wrinkled surface.

FRILL-LIZARD, a large Australian lizard (*Chlamydosaurus kingi*) of the family Agamidæ, so called in allusion to the erectile collar or ruff about its neck. This broad membrane is supported on each side of the neck by slender rods from the hyoid bone which extend to its margin like the sticks of a fan; and like a fan it may be folded close against the shoulders or spread until it stands up all around the back part of the head; but this erection can be accomplished only by opening the mouth widely, and always accompanies a stretching apart of the jaws. The exterior of the frill is of the general grayish-brown of the animal's body, but its interior or front is scarlet: and when it is suddenly spread in the face of an enemy

behind the open hissing mouth, it is calculated to astonish and frighten the attacker in no small degree, as seems to be the purpose of the structure. These lizards are 6 to 8 inches long plus a long, lash-like tail. They spend their time on trees and logs, searching for the beetles which constitute their principal food; and have an extraordinary manner, when in haste, of rising and running upon their hind legs alone. The species has been extensively described and illustrated by Saville Kent in his books on the natural history of tropical Australia.

FRIMAIRE, n. *frē-mär'* [F.]: term meaning frosty or sleety, but freely translated by an English wit freezy: adopted 1793, October, by the French Convention, for the third month of the republican year, November 21—December 20. See CALENDAR.

FRINGE, n. *frĭnj* [F. *frange;* OF. *fringe*—from mid. L. *fimbrĭă;* It. *frangia;* Ger. *franse,* a border of hanging threads: F. *froncer,* to plait, to wrinkle]: an edging of loose threads or ornamental open work; the edge; the margin. *Fringes,* in *optics,* those colored bands of diffraction (q.v.) which appear when a beam of light passes the clean edge of a screen, or is transmitted through a narrow slit or hole: V. to ornament with a loose border; to adorn with fringe. FRING'ING, imp. FRINGED, pp. *frĭnjd:* ADJ. bordered with a fringe. FRINGE'LESS, a. without a fringe. FRINGE OF THE GARMENT, called also the border or hem, prescribed by Moses, Num. xv. 38-41, to be worn by the Jews as a memento of the Divine law which had been given them: hence in later ages it gained a superstitious respect, and its enlargement was a Pharisaic custom, rebuked by Christ; and the woman in the throng around him secretly touched the fringe of his garment for healing, deeming it the most sacred and powerful part of his vesture. FRINGING REEFS, coral reefs fringing or encircling islands at a small distance from shore.

FRINGE TREE (*Chionanthus*): genus of plants of the nat. ord. *Oleaceæ,* consisting of small trees or large shrubs, natives of America, the W. Indies, Ceylon, and New Holland. The Common Fringe tree or SNOWFLOWER (*C. Virginica*) is found in the United States from lat. 39° to the Gulf of Mexico. It sometimes attains the height of 20 or 30 ft., but is rarely more than 8 or 10, has opposite oval leaves 6 or 7 inches long, and very numerous snow-white flowers in panicled racemes. The limb of the corolla is divided into four long linear segments, whence the name fringe tree. The fruit is an oval drupe. The tree is frequently cultivated as an ornamental plant.

FRINGILLIDÆ, *frĭn-jĭl'lĭ-dē:* family of birds of the ord. *Insessores,* tribe *Conirostres,* having a conical or nearly conical bill, sometimes short and thick, sometimes comparatively slender and elongated, sometimes convex above, below, or at the sides; the commissure—line of junction of the mandibles—straight. The neck is short, and neither the legs nor the wings are long. The Fringillidæ all are

small birds; they feed chiefly on seeds—to some extent also on insects. The family is extremely numerous, and distributed over all parts of the world; including finches, linnets, sparrows, grosbeaks, crossbills, etc.; also weaver-birds, bobolinks, cardinal-birds, whydahs, tanagers, etc. Some naturalists extend its limits to include in it other groups, as buntings, larks, etc., often regarded as forming distinct families.

FRIPPERY, n. *frĭp'ėr-ĭ* [F. *friperie*, old clothes, rags—from *friper;* OF. *fripper*, to wear to rags: Sw. *rifva*, to tear]: clothes thrown aside after wearing; place where old clothes are sold; useless or worthless trifles; tawdry finery; Adj. in *OE.*, trifling; contemptible.

FRISCHES HAFF, *frĭsh'ės haf* ('Fresh-water Bay'): large lagoon on the coast of Prussia, s.e. of the Gulf of Dantzic; somewhat less than 60 m. in length from n.e. to s.w., with a breadth varying from 4 to 12 m.; area 318 sq. m. It was formerly entirely walled off from the Baltic by the Frische Nehrung, a narrow spit of land extending about 40 m. along its northern shore. In 1510, however, the waters of the Frisches Haff broke over the Frische Nehrung, and formed the passage called the 'Gatt,' which unites this shore-lake with the Baltic. The Gatt is only 10 to 15 ft. in depth. All large vessels load and unload at Pillau, at the mouth of the Gatt, on the shore of the Gulf of Dantzig. Cargoes are conveyed to and from the ports on the Frisches Haff by means of lighters. The Pregel, Frisching, Passarges and two arms of the Vistula, fall into this lagoon.

FRISEUR, n. *frē-zėr'* [F. *friseur*—from *friser*, to curl], a hairdresser.

FRISIANS, *frĭz'yanz* or *frĭz'ĭ-anz* (Lat. *Frisii*): ancient Teutonic race in the n.w. of Germany. The origin of the name is lost in antiquity, though traditions, collected and written in *Thet oera Linda Bok*, in the 13th c. (see below) say that the Frisians came out of India, and that Frya, the mother of the race, was white as snow. The Frisians are mentioned by Tacitus and Pliny, and occupied the country between the middle arm of the Rhine (which fell into the sea at Katwyk) and the Ems or the Weser. With the Batavi, the Bructeri, and the Chauci, the Frisians became subject to Rome under Drusus, and for a time remained faithful; but, in A.D. 28, these German tribes were driven to hostilities by the oppression of the Romans, and though partially subdued, they again rebelled, 70, under Claudius Civilis, a Batavian, who made a bold but unsuccessful attempt to overthrow the Roman power in German Gaul. When at a later period the Batavi were absorbed by the Franks, and with them moved southward, the Frisians took possession of the abandoned districts, and occupied the country from the islands of the Scheldt to the Ems or Weser, so that the Netherlands, except some French and Saxon colonies, were peculiarly Frisian. These formed two branches, the one dwelling w. of the Zuyder Zee and

the other e. of it. The Frisii of the s.w. were brought under the Franks by Pepin d'Heristal, who defeated them (689), and compelled them to embrace Christianity. The e. branch (785) was subdued by Charlemagne, who sent Christian teachers to preach the gospel to them, and who (802) defined their rights by the *Lex Frisionum.*

Later, the districts now called Friesland (q.v.) were reduced to their present limited boundaries by the formation of the hereditary countships of Holland, Zealand, Gueldres cum Zutphen, and the bishopric of Utrecht cum Yssel. Friesland was independent, and ruled by potentates chosen by the nation and endowed with limited powers, 802 to 1498. The counts of Holland coveted the sovereignty of Friesland, and internal discord at length gave the emperor of Germany a pretext for placing Duke Albert of Saxony (1498) as hereditary potentate. His son resigned the right, for a sum of money, to Charles V., who became Lord of Friesland as of the rest of the Netherlands. After the revolution in the 16th c., the Frisians had a stadtholder of the house of Nassau-Dietz. Several of these fell in the contest for freedom. Count John William Friso became Prince of Orange on the death of William III. His son, William Karel Hendrik Friso, became stadtholder of the seven united districts. The Frisians are brave, attached to their manners and customs, upright, open-hearted, and intelligent. The Frisian language belongs to the Low German branch of the Teutonic, and is closely allied to the old Anglo-Saxon; it is, indeed, of all forms of speech now existing, the nearest to the Anglo-Saxon basis of the English language. The favorite poet of the peasantry is Gysbert Japicx. There is a set of laws for the Frisians, composed about 1,200, and a complete collection of the laws extant was published by Richthofen (*Fries Rechtsquellen,* Gött. (1840). A Frisian Soc. of History, Antiquity, and Language, at Leeuwarden, has done much for a revival of Frisian literature. Among historical writers are Simon Abbes Gabbema, 1628–51; Petrus Wierdsma, 1729–1811; Foeke Sjoerds, 1713-70, etc. Since the 15th c. the Frisian language has gradually given place to the Dutch: it is still spoken in the rural parts of the present province of W. Friesland and, with modifications, in some other districts. It is used only by the peasantry, and not in schools or churches. Dutch is generally spoken in the towns. Efforts have been made to revive the Frisian by publishing the best specimens of the literature, annuals, etc. Among these are the poetical works of Gysbert Japicx, with a Friesch-Dutch Dictionary of the words; and *Thet oera Linda Bok,* edited and translated by Dr. Ottema, now reckoned by scholars an audacious and brilliant forgery. The best Frisian dictionaries are the *Friesch-Latin-Nederlandsch Woordenbook* (1874), and Richthofen's *Altfriesisches Wörterbuch* (1840).

FRISK, v. *frĭsk* [OF. *frisque,* lively, brisk: Icel. *friskr,* in full vigor, brisk: Sw. *frisk,* fresh: It. *frizzare,* to quaver, to spirt: comp. Gael. *friosg,* lively]: to leap and skip about;

to gambol in frolic and gayety: N. a frolic; a caper. FRIS'KING, imp. FRISKED, pp. *frĭskt.* FRISKY, a. *frĭs'kĭ,* lively; frolicsome. FRIS'KILY, ad. *-lĭ.* FRIS'KINESS, n. dancing or leaping in frolic; liveliness.

FRISKET, n. *frĭs'kĕt,* or FRIS'QUET, n. *-kĕt* [F. *frisquette,* frisket, so called from the frequency and briskness of its motion: connected with FRISK]: in *printing,* the light frame which holds the sheet of paper on the tympan.

FRIT, or FRITT, n. *frĭt* [F. *fritte*—from It. *fritta,* frit—from L. *frictus,* dried, parched]: the mixture of which glass is made after being calcined or baked in the furnace, but before the materials are melted.

FRIT, *frĭt* (*Oscinis Frit,* or *Chlorops Frit*): insect of the same family with the house-fly; an active greenish-black fly of the size of a large flea, which does great injury to barley crops in some n. parts of Europe. It lays its eggs in the flowers, and its larvæ live on the young grains. Linnæus affirms that a tenth part of the barley in Sweden and Lapland in annually destroyed by it. It is nearly allied to the insects called corn-fly and wheat-fly.

FRITH, *frĭth,* or FIRTH, *fĕrth* [Lat. *fretum,* Gr. *porthmos;* from the same root as Ferry, (q.v.)]: arm or channel of the sea that is passed or crossed; the widening of a river as it opens into the sea: see FIRTH.

FRITH, *frĭth* (or FRYTH), JOHN: abt. 1503–1533, July 4; b. Sevenoaks, Kent: English reformer and martyr. He was educated at Eton and King's College, Cambridge, removed to Card. Wolsey's newly-founded college (now Christ Church) at Oxford 1525, was imprisoned by the Romanists as a heretic because of his sympathy with the reformation in Germany, was released through Wolsey's influence and fled to the continent 1528, resided some time in the Univ. of Warburg, was associated with Tyndal in literary work, and became intimate with the leading scholars and reformers. While at Warburg he published a translation of Hamilton's *Places,* shortly after Hamilton's martyrdom; the *Revelation of Antichrist,* translated from the German; *An Antithesis wherein are compared togeder Christes Actes and our Holye Father the Popes* (1529); and *Disputacyon of Purgatorye,* a treatise against Sir Thomas More, Bishop Fisher of Rochester, and Rastell (1531). He returned to England 1532, and for several months evaded arrest on a warrant issued on behalf of Sir Thomas More, then lord chancellor, but was captured when about escaping to Flanders, and imprisoned in the tower at London. At first he was treated with severity, but on the accession of Sir T. Audley to the chancellorship more lenient measures were sanctioned, particularly by Thomas Cromwell and Cranmer. But he persisted in maintaining his views on purgatory, and while in confinement wrote a treatise on the Lord's Supper in which he denied transubstantiation. King Henry, taunted in a lenten sermon with holding him in the tower 'rather for safeguard than for punishment', ordered that he be formally examined. He was tried, ad-

judged guilty of denying that the doctrines of purgatory and transubstantiation were necessary articles of faith, and condemned to the stake by Dr. Stokesly, Bishop of London. His publications also include *A Mirror or Glass to Know Thyself*, and *A Mirror or Looking-glass wherein you may behold the Sacrament of Baptism*. Cranmer, one of his judges, was condemned and burned 23 years afterward for advocating precisely similar views regarding the Lord's Supper.

FRITH, *frĭth*, WILLIAM POWELL, R.A.: English artist: b. Ripon, Yorkshire, 1819, Jan. 9. In 1840, he exhibited, at the Royal Acad., London, a scene from Shakspeare's *Twelfth Night*, *Malvolio before the Countess Olivia*, which attracted attention. In 1841 he exhibited the *Parting Interview of Leicester and his Countess Amy*, from Scott's *Kenilworth*; and thenceforth rose rapidly in public estimation. Among his paintings are the following: *My Wife would bid both stand up to see which was the Tallest.* from the *Vicar of Wakefield*, 1842; *English Merrymaking a Hundred Years ago*, 1847: *An Old Woman Accused of Witchcraft in the Time of James I.*, 1848; and *Coming of Age*, 1849; etc. Frith was elected an associate of the Acad. 1845, and a royal academician 1853. In 1854, his *Life at the Seaside* was one of the leading features of the Exhibition. *The Derby Day* (1858) and *Claude Duval* (1860) are two of his most successful pictures. For the *Railway Station* (1862), he is said to have received 8,700 guineas. In 1865 he painted the *Marriage of the Prince of Wales*. The series called the *Road to Ruin* was produced 1878. Frith was elected an honorary member of the Imperial Acad. of Fine Arts at Vienna, 1869; of the Royal Acad. of Belgium 1871; and Sweden 1873. Published *Reminiscences* 1888.

FRITHJOF'S (or FRITHIOF'S) SAGA, *frĭth'yofs sâ'ga*: ancient Icelandic myth, probably first written at the end of the 13th or beginning of the 14th c.; recording the life and adventures of the hero Frithjof (properly *Fridhthjofr* i. e., 'peace-destroyer'), who loved the beautiful Ingeborg, daughter of a petty king of Norway. After being rejected by the brothers of Ingeborg, and having committed various acts of revenge on his enemies, he comes to the court of the old king Hring, to whom Ingeborg has been married, and is received with kindness. At the death of her husband Ingeborg is married to her lover, who acquires with her hand the dominions of Hring, over which he rules prosperously to the end of his days. Frithjof is supposed to have lived in the 8th c.; but some writers assign to him a much earlier period. This Saga was included by Björner in his collection *Nordiska Kämpadater* (Stoch. 1737); and by Rafu in his *Fornaldar Sögur Nordhrlanda* (Copen. 1829). Attention has of late years been drawn especially to this ancient Saga, which is merely one of a number of similar mythical narratives, in consequence of the distinguished Swedish poet, Bishop Tegner, having selected it for the groundwork of a poem (*Frithjof's Saga*), which was

published complete 1825, and at once became the most popular poem that had ever appeared in Sweden, bringing its author to high repute. Tegner follows the Saga so closely, that the merits or demerits of the plan of the story must be ascribed more to the original than to himself; but foreigners scarcely discern in the poem the excellences attributed to it by Swedish critics. The diversity of metre employed in the 24 cantos, of which each differs wholly from the others, detracts from the completeness of the whole, and produces an inharmonious effect. The *Frithjof's Saga* of Tegner has been translated into several other languages; among the six or seven English translations, are those by R. G. Latham (1838) and G. Stephens (1841).

FRITILLARY, n. *frĭt'ĭl-ėr-ĭ* [L. *fritillus*, a dice-box], (*Fritillaria*): genus of plants of the nat. ord. *Liliacœ*, herbaceous, bulbous-rooted, with bell-shaped perianth of six distinct segments, each having a conspicuous honey-pore (nectary) at the base. About 20 species are known, natives of Europe and other temperate regions of the n. hemisphere. All have drooping flowers; some are beautiful. The Common Fritillary (*F. meleagris*), found in meadows and pastures in the e. and s. of England, flowers in April or May: the stem, about 12 inches high, bears several linear leaves, and in general only one flower, which is flesh-colored, marked with many dark spots. Many varieties are in cultivation. The genus includes the Crown Imperial (*F. Imperialis*), native of Persia and the n. of India, a well-known ornament of gardens.

FRITILLARY: name of a number of species of butterfly, from the resemblance of the coloring of their wings to that of the petals of the common fritillary. This resemblance appears only on the upper side of the wings, the under side being often remarkable for metallic brilliancy.

FRITTER, v. *frĭt'tėr* [L. *fritinnīrĕ*, to twitter: F. *frétiller*, to fidget: Gr. *phrittō*, I tremble]: to cut or break into small pieces; to waste away by bits or degrees: N. a fragment or shred. Frit'tering, imp. Frit'tered, pp. *-tėrd*.

FRITTER, n. *frĭt'tėr* [F. *friture*, a frying—from mid. L. *frictūra*: It. *frittare*, to fry in a pan (see Fry 1)]: a small cake or piece of meat, or fruit, fried; a pancake; generally, preparations of butter.

FRITZ, John, American iron and steel expert: b. Londonderry, Pa., 1822. He was at first a machinist in shops at Parkersburg and Norristown, and subsequently was a constructor of rolling-mills, acquiring in the latter capacity an authoritative knowledge of iron and steel manufacture. He equipped the Bethlehem iron and steel works, and was for many years manager of that well-known establishment. Many methods of manufacture now in general use were employed by Fritz among the first in this country, including the Bessemer process. Several manufacturers and scientists established in 1902 the award of the Fritz medal to be given for discovery in the fields of science.

FRITZSCHEITE, n. *frĭt'shĕh-īt*: a vitreous or pearly reddish-brown or hyacinth mineral; found in Bohemia and Saxony.

FRIULI, *frē-ō'lē* (Ger. *Friaul*; anc. *Forum Julii*): old name of a region in the extreme n.e. of Italy at the head of the Gulf of Venice; early divided into *Austrian* and *Venetian* Friuli. The former comprises the Austrian districts of Görz and Gradiska and Idria; the latter, the Italian province of Udine. Friuli is rich in corn and wine, has much metallic wealth and numerous mineral springs. The inhabitants of Venetian Friuli are mostly *Furlani*, speaking a dialect akin to Italian, mixed with Celtic elements. Austrian Friuli is peopled mainly by Slavs, with many Italians. Friuli constituted one of the 36 duchies into which the Lombards divided the n. of Italy, and shared the vicissitudes of its neighbor states.

FRIVOLOUS, a. *frĭv'ŏ-lŭs* [F. *frivole*—from L. *frivŏlŭs*, trifling: It. *frivolo*]: slight; trifling; of little weight or importance. FRIV'OLOUSLY, ad. *-lĭ*. FRIV'OLOUSNESS, n. the quality of being of very little worth or importance. FRIVOLITY, n. *frĭ-vŏl'ĭ-tĭ*, acts or habits of trifling.—SYN. of 'frivolous': petty; trivial; unimportant; worthless; silly.

FRIV'OLOUS AND VEXA'TIOUS: terms applied in law to insufficient grounds of objection as alleged in petitions or formulated in indictments, or brought in actions at law. They are prohibited by statute, and subject the party presenting them to cost and damages.

FRIZZ, v. *frĭz* [F. *frizer*, to curl: Gr. *phrix*, originally a rustling sound; *phrixos*, rough, curled]: to form into small curls; to form into little hard prominences or burs, as the nap of cloth. FRIZ'ZING, imp. FRIZZED, pp. *frĭzd*. FRIZZLE, v. *frĭz'l*, to curl or crisp in small short curls. FRIZZLING, imp. *frĭz'lĭng*. FRIZZLED, pp. *frĭz'ld*.

FRO, ad. *frō* [AS. or Dan. *fra*: contr. of FROM, which see]: from; back or backward. TO AND FRO, there and back; backward and forward.

FROBENIUS, *frō-bē'nĭ-us* (or FROBEN), JOANNES 1460–1527: learned printer of Basel. He was educated at the Univ. of Basel. He was intimate with Erasmus, and employed him and Œcolampadius to superintend the printing of various important works. He was the first German printer who did nearly perfect work; and between 1491 and 1527, the year of his death, he issued 300 works (including all those of Erasmus).

FROBISHER, *frŏb'ĭsh-ėr* or *frō'bĭsh-ėr*, Sir MARTIN: abt. 1535–1594, Nov. 7; b. Doncaster: naval adventurer of the Elizabethan period, the first Englishman who sought to discover a n.w. passage to China. For many years, he in vain labored to impress English merchants with an idea of the importance of a n.w. passage; but at length, being patronized by some persons of rank and fortune, he succeeded in raising money enough to fit out two small vessels of 25 tons each, and a pinnace of 10 tons. With these he sailed from Deptford 1576, June 8, the queen, then at

Greenwich, bidding them Godspeed on their venturous way by 'shaking her hand at them out of the window.' Steering north, they (July 11, in lat. 61° n.) sighted the s. part of Greenland, which Frobisher took to be the Friesland of Zeno, on July 11, to the east point of which Frobisher gave the name of 'Queen Elizabeth's Foreland;' and on the 28th, they sighted *Meta Incognita*. On Aug. 11, Frobisher entered the inlet which bears his name, then thought to be one of the entrances from Davis' Strait into Hudson's Bay. After about a fortnight's exploration of the coasts and islands, Frobisher—having lost, through the treachery of the natives, a boat and five men—returned to England. He brought with him some ore picked up on one of the islands that he discovered, in which some gold was found. Visions of immense wealth to be derived from further search in these northern lands floated before the eyes of the speculators of the time, who immediately fitted out another and better appointed expedition, giving the command to Frobisher. He sailed 1577, May, but his discoveries, hampered as he was by the gold-seeking operations, which turned out comparatively worthless, did not extend further than the neighborhood of the strait that he had before reached. A third expedition was sent out in the year following, but geographical science appears to have been but little benefited by it. Frobisher afterward served under Drake in the W. Indies; and for his distinguished bravery in the fight with the Spanish Armada, 1588, July 26, he received knighthood. He afterward commanded a squadron sent out to ravage the Spanish coast. He died from the effects of a wound received while leading an attack by sea against Brest.

FROBISHER BAY: arctic inlet opening westward near the mouth of Davis' Strait into the territory called by Frobisher *Meta Incognita*, at the s. end of Baffin Land. It is about 200 m. long and more than 20 wide, with rugged mountainous shores. It was till Hall's voyage called Frobisher *Strait*, being erroneously regarded as a passage into Hudson's Bay.

FROCK, n. *frŏk* [F. *froc*, a monk's habit—from mid. L. *frocus*, a shaggy cloak, a monk's frock: Port. *frocco*, a tuft of wool; comp. Gael. *frag*, a covering]: a loose upper dress worn by children and women; a loose upper garment worn by men. FROCKED, a. *frŏkt*, dressed in a frock. FROCK'-LESS, a. without a frock. FROCK-COAT, a coat with skirts meeting in front. MONK'S FROCK, a monk's outer garment. SMOCK FROCK, a loose outer garment worn principally by agricultural laborers in England; a blouse. To UNFROCK A CLERGYMAN, to suspend him for bad conduct.

FRODOART: see FLODOARD.

FROEBEL (or FRÖBEL), *frö'bĕl*, FRIEDRICH WILHELM AUGUST: 1782, Apr. 21—1852, June 21; b. Oberweissbach: founder of the kindergarten system of education. He followed various occupations ere he discovered where his real

strength lay; but in 1805 he taught in a model school at Frankfurt-on-the-Main with much success, and afterward he entered Pestalozzi's institution at Yverdon. In the campaign of 1813, he served as a volunteer. In 1817 he established a school at Keilhau, in Thuringia, to carry out his principle of promoting the full and harmonious development of child nature. After 14 years of labor, he went to Switzerland, where he founded several schools. On his return to Germany, he devoted himself to the education of very young children; and in 1837 he opened at Blankenburg, his celebrated *Kindergarten*, or 'Garden of Children,' which languished for want of funds, and ultimately was given up. As Froebel's views and his system were confounded with those of his socialist nephew, Karl Froebel, the Prussian government actually prohibited the founding of schools on Froebel's principles; and it was not till after his death that the Kindergarten system—his great claim to grateful remembrance—found acceptance in Germany. In the later years of his life, Froebel employed himself in training female teachers. He died at Marienthal. With the exception of that remarkable book *The Education of Man* (1826), his most important literary work was done after 1836; *Pedagogics of the Kindergarten*, the first great European contribution to the subject of child-study, appearing from 1837 to 1840 in the form of separate essays, and the *Mutter-und-Kose Lieder* (Mother-Play) in 1843. Many of his educational aphorisms and occasional speeches were preserved by his great disciple the Baroness von Marenholtz-Bülow in her *Reminiscences of Froebel;* and though two most interesting volumes of his correspondence have been published, there remain a number of letters, as well as essays and educational sketches, not yet rendered into English. Judged by ordinary worldly standards, his life was an unsuccessful one, full of trials and privations, and empty of reward. His deathblow was doubtless struck by the prohibition of kindergartens in Prussia in 1851, an edict which remained nine years in force. His strength had been too sorely tried to resist this final crushing misfortune, and he passed away the following year. Consult: von Marenholtz-Bülow, *Reminiscences of Friedrich Froebel;* Barnard, *Papers on Froebel's Kindergarten* (1881); Hauschmann, *Froebel's Kindergarten System;* Bowen, *Froebel* (1897); Quick, *Educational Reformers.* See KINDERGARTEN.

FROEBEL, *frö'bel* (or FRÖBEL), JULIUS: nephew of Friedrich Froebel: author: b. Greisheim, Germany, 1805; d. 1893, Nov. 7. He studied at Rudolstadt, Keilhau, Stuttgart, Munich, Weimar, and Berlin, removed to Zurich 1833 and was several years prof. of geography and the natural sciences, published several works, became a naturalized citizen, and started the *Swiss Republican,* a radical opposition newspaper, 1839. After the revolution in Prussia 1848 he was chosen a member of the national assembly, and in Oct. went to Vienna, where he was arrested and condemned to death by a court martial.

He was pardoned, returned to Switzerland after the defeat of his party, and came to the United States 1850. For six years he traveled extensively as correspondent of the New York *Tribune*, returning to Germany as a naturalized citizen of the United States 1857. In 1862 he settled in Vienna and became active in liberal politics, and 1867 started the *South German Press* in Munich, which he edited till 1873, when he was appointed German consul to Smyrna. In 1876 he was transferred to Algiers. His leading works are *System of Crystallography* (Zurich 1843); *System of Social Politics* (London 1847); *The Republican*, historical drama (Leipsic 1848); *Seven Years' Travel in Central America, Northern Mexico, and the Far West of the United States*, 2 vols. (1857–8); *Theory of Politics* (1861); *Political Addresses* (1870).

FROELIGH, *frö'lich*, SOLOMON: 1750, May 29—1827, Oct. 8; b. Red Hook, N. Y.: Dutch Ref. minister. He was the son of a farmer, brought up in the Dutch Ref. Church, educated for the ministry by Johannes H. Goetschius, licensed to preach 1774, and after serving in the revolutionary army, removed to Hackensack, N. J., 1786. The Dutch Ref. Church for some time had been divided into an independent and a conservative branch, and during the war the breach had been widened by political considerations. Froeligh attempted to unite the congregations and was meeting with some success when lightning broke the stone over the entrance of his church bearing the words 'Union makes Strength,' and the congregations alarmed at what they believed to be an ill-omen became more opposed than ever to his overtures. He pleaded for union and engaged in the ecclesiastical controversies of the day till 1822, when with the adherents of the independent branch he organized the 'True Reformed Dutch Church.' For this act he was suspended by his synod. His numerous publications include *The Trial of Universal Charity by a Jury* (New York 1824); and *Reasons Assigned by a Number of Ministers, Elders and Deacons for declaring themselves the True Reformed Dutch Church in the United States* (Hackensack 1822).

FROG, n. *frŏg* [AS. *frogga;* Icel. *froskr;* Ger. *frosche;* Dut. *vorsch*, a frog: comp. Gael. *frog*, a marsh, a fen]: an amphibious four-footed reptile. FROG-FISH, a sea-fish, also called the angler (see below). FROG-BIT, a marsh plant, the *Hydrŏch'ărĭs mŏrsus-ranæ*, ord. *Hydrocharĭdācĕæ* (see HYDROCHARIDEÆ). FROG-FLY and FROG HOPPER (see FROTH-FLY). FROG-SPAWN, properly the gelatinous mass in which the ova of frogs are inclosed; but colloquially applied to the green slimy masses of certain fresh-water algæ on the surface of streams. FROG-SPIT, same as cuckoo-spit (q.v.): see also FROTH-FLY.

FROG, n. *frŏg* [F. *fourchette*, a little fork—from *fourche*, a fork—from L. *furca*]: a ligamentous or horny structure in the middle of the sole of a horse's foot; probably corrupted as if from *fork;* it is also called a *frush.* In *rail-*

ways, a similarly shaped mass of steel where placed rails cross at a low angle.

FROG, n. *frŏg* [Port. *frocco*, a tuft of wool or silk]: a kind of button or tassel on a coat. FROGGED, a. *frŏgd*, ornamented with frogs; a term applied often to uniforms with stripes or workings of braid or lace, mostly on the breast of a coat.

FROG (*Rana*): genus of *Batrachia*, having in the adult state four legs and no tail, no gills, four toes on each of the fore-feet, five on each of the hind-feet, the feet more or less webbed; the head flat, the muzzle rounded; the mouth very large, a row of small teeth in the upper jaw, and an interrupted transverse row on the middle of the palate. The young (tadpoles) breathe by means of gills; external gills forming little fringes at the sides of the neck when they are very young, which, however, in a few days disappear; the gills, which remain until the tadpoles undergo their final metamorphosis into frogs, being very numerous minute crests attached to four cartilaginous arches on each side of the neck, in a cavity to which the water enters from the mouth, and from which it is expelled by one or two small orifices. Tadpoles have no legs, and the body tapers into a tail, and thus has a fish-like form, very different from that of the mature frog, the tail being furnished with a membranous border like a fin. The mouth of the tadpole is a horny beak, which falls off when it becomes a frog. When this metamorphosis takes place, the hind-legs grow first, and afterward the fore-legs begin to appear, the tail being gradually absorbed. Tadpoles are capable of living in water only; but the mature frog visits the water only occasionally, though generally capable of remaining long immersed, and always preferring moist places. In respiration, frogs draw in air through the nostrils, by movements of the muscles of the throat, and expel it by contraction of those of the lower part of the abdomen. The thin smooth skin of frogs is also believed to be subservient to the aëration of the blood. The skeleton is destitute of ribs. The eye is large and beautiful. The colors are often pleasing, and the general aspect agreeable, in some species very much so, forming a strong contrast to the replusive appearance presented by toads, notwithstanding the close affinity between them in structure and habits. The greater proportionate length and strength of the hind-legs enables frogs to leap to a distance wonderful for creatures of their size, instead of crawling as toads do, and their activity and liveliness complete the contrast. The males have on each side of the neck a delicate membrane, which becomes inflated with air when they croak. The power of voice in the females is much inferior. The croaking of numerous frogs in marshy places, or around ponds and ditches, often makes an amusing and curious concert; and the powers of voice possessed by the great Bull-frogs (q.v.) of N. America are amazing. The neighborhood of Rio Janeiro is enlivened as night comes on by the Blacksmith frog, which

croaks so sonorously that the noise is like the clanging of a hammer on an anvil, the intermingled voices of some other kinds resembling the lowing of cattle at a distance; and in Peru, there is a frog, of large dimensions, which has acquired the name of *Trapichero*, or Sugar-miller, because its voice has a grating sound like that produced by a sugar-mill. The confused blending of the voices of different species of frogs, in these countries, destroying the stillness of night, is one of the things most certain to arrest the attention of the stranger. In colder climates, frogs usually bury themselves in mud and spend the winter in torpidity. In dry weather, they conceal themselves under shrubs and in tufts of herbage, from which rain quickly causes them to come forth, multitudes often appearing where not one was to be seen before. They feed chiefly on insects, slugs, etc. The beaks of tadpoles are adapted to the eating of leaves and other vegetable food, on which Cuvier says they entirely subsist; but the younger Buckland, in his *Curiosities of Natural History* (4th ed., Lond. 1859, pp. 2–4), in an amusing account of the habits of tadpoles, more correctly describes them as showing a great avidity for animal food, crowding round a dead kitten, and nibbling at the toes of little boys who wade in pools where they abound. The spawn of frogs is a gelatinous mass, in which the eggs are contained, and which swells greatly by imbibing moisture. Impregnation takes place after it is deposited, as with the spawn of fishes.

The Red Frog (*R. temporaria*), known by that name in France, and abundant in most parts of England and Scotland, is said to be not truly indigenous to Ireland, and to have been introduced into that island 1696. Its generally reddish color, varied with black spots and patches, readily distinguishes it from the Green Frog or Edible Frog. (*R. esculenta*) of the s. of Europe—sometimes said also to have been found in Britain—which is olive green, with yellow stripes along the back, and generally larger than the red species. A remarkable peculiarity is exhibited by some frogs of tropical countries in a hornlike prominence above each eye. These have been separated into a new genus (*Ceratophris*). The Tree Frogs (q.v.), (*Hyla*), the most beautiful and interesting of all, have the extremities of the toes enlarged into a sort of cushion, secreting a viscid humor. Several other genera have been separated from the Linnæan genus *Rana*, but there is a strong family likeness among them all.

The use of frogs for food is in some countries regarded with disgust, but is very common in some southern countries of Europe, where, indeed, this food is regarded as particularly delicate. The species chiefly used as food in Europe is the Green Frog (*Rana esculenta*), above mentioned, which greatly abounds in ponds and slow streams in France, s. Germany, and Italy. It feeds chiefly on insects, after which it darts with great agility on the banks, and may often be seen swimming with its head above water, or basking in the sunshine. Frogs are there taken

for the markets by nets, and by a kind of rake. In Vienna, they are kept and fattened in preserves adopted to the purpose. In France, the hind-quarters alone are prepared for the table; in Germany, all the muscular parts. They are dressed in various ways, and with various sauces, of which a great part often consists of wine. The GRUNTING FROG (*R. grunniens*) of the W. Indies, a very large species, six or eight inches long, capable of leaping over a five-ft. wall, is much used for food, its flesh being very white and delicate, and is often fattened for the table. It shows considerable capacity for domestication, and readily becomes familiar. A species of frog (*Pyxicephalus adspersus* of Dr. Smith) is much used as food by the native tribes of s. Africa. Dr. Livingstone says the Bechuanas suppose it to fall from thunder-clouds, because after a thunder-shower the pools become alive with frogs, till then hidden in holes. This species is nearly six inches long, and when cooked resembles chicken. See AMPHIBIA: BATRACHIA. For frogs generally consult Gadow's *Amphibia and Reptiles* (1901); for those of the United States the writings of Holbrook, C. C. Abbott, O. P. Hay, A. W. Butler, and especially *North American Batrachia*, by E. D. Cope.

FROG'-FISH (*Batrachus*): genus of acanthopterygian fishes of the family *Lophiidæ*, to which also the Angler (q.v.) or Fishing Frog belongs. They are remarkable for excessive ugliness. The head is larger than the body; flattened, and spiny; the mouth is very large, with many teeth, the lips are often furnished with filaments; the pectoral fins are supported by a short stalk or wrist. The skin is naked in some species, scaly in others. The species are numerous and widely distributed. They hide themselves in the sand to surprise their prey.

FROH'MAN, CHARLES, American theatrical manager: b. Sandusky, Ohio, 1858. Having managed several road companies, he took charge of the Empire Theatre, New York, in 1893, and in 1895–6 organized the syndicate which exercises so large a monopoly in American theatrical affairs.

FROHMAN, DANIEL, American theatrical manager: b. Sandusky, Ohio, 1853. He began business life with five years in newspaper offices; he subsequently became manager of a traveling theatrical company, since which he has successfully managed several New York theatres, as well as English and American stars and theatrical companies. He is at present manager of the Lyceum Theatre, Daly's Theatre, and the Daniel Frohman Stock Company.

FROHS'DORF. See FROSCHDORF.

FROISSART, *froys'sârt*, F. *frwâ-sâr'*, JEAN: 1337–1410; b. Valenciennes: French poet and historian. Being destined for the priesthood, he received a liberal education, but soon evinced a passion for poetry and the charms of knightly society. At the age of 20, he began to write a history of the wars of his time, and made several journeys

to examine the scene of their events. The composition of this work, which forms the first part of his Chronicles, occupied him 1357–60. On its completion, he went over to England, where he was received with great favor by Philippa of Hainault, wife of Edward III. In 1362, she appointed him clerk of her chapel and secretary. Two years afterward, he visited Scotland, where he became the guest of King David Bruce, and also of William Earl of Douglas. Everywhere the gay, poetical, quick-witted, and shrewdly observant Frenchman was welcomed and honored. In 1366, he accompanied the Black Prince to Aquitaine and Bordeaux. He afterward went with the Duke of Clarence to Italy. Froissart, with Chaucer and Petrarch, was present at the marriage of this prince, at Milan, with the daughter of Galeazzo Visconti, and directed the festivities given by Amadeus VI., of Savoy, in honor of the duke. On the death of his protectress Philippa, Froissart gave up all connection with England, and, after many adventures, entered the service of Wenceslaus, Duke of Brabant, as private secretary. The duke was himself a poet, and Froissart made a collection of his verses, to which he added some of his own, and entitled the whole *Meliador, or the Knight of the Golden Sun*. On the death of Wenceslaus, he entered the service of Guy, Count of Blois, who encouraged him to continue his Chronicles. He journeyed to the court of Gaston Phœbus, Count de Foix, that he might hear from the lips of the knights of Bearn and Cascony an account of their exploits. Froissart made several similar journeys. In 1394 he obtained the canonry and treasurership of the collegiate church of Chimay; in the following year visited England, where he was courteously and generously entertained by King Richard II.; and on his return spent the remainder of his life in completing his great work. He died at Chimay. Froissart's Chronicles embrace the events occurring 1326–1400, and are valuable documents for illustrating the character and manners of his age. The pageantry of feudal times brightens his pages; the din of arms, the shouting of knights, and the marshalling of troops, is ever and anon heard; while 'visions of fair women' rise before us as we read. The gorgeous feasts and spectacles in which Froissart so much delighted are set forth in copious details; and though Froissart was no philosopher, his shrewd observations and richly minute descriptions have helped others to philosophize. Froissart's Chronicles first appeared at Paris about the end of the 15th c., under the title of *Chroniques de France, d'Angleterre, d'Ecosse, d'Espagne, de Bretagne, de Gascogne, Flandres et lieux d'alentour*. The best edition is that of Buchon (15 vols., Paris 1824–26). His poems have been published by Buchon (Par. 1829). The beautiful MS. of the Chronicles in the library at Breslau was executed 1468, and was secured to the town in a separate article, when Breslau capitulated to the French 1806. The Chronicles have been translated into Latin and several modern languages. England has

two versions: one executed 1523–25 by Bourchier Lord Berners (reprinted 1812); and the other in 1803–5 by Thomas Johnes (reprinted by Bohn 1845). The latter is the more exact; but the former, according to Sir Walter Scott, is the more artless and lively.

FROLIC, n. sometimes FROLICK, n. *frŏl'ĭk* [Ger. *fröhlich* in good humor—from *froh*, gay; *lich*, like: Dut. *vrolijk*, merry, gay]: a wild prank; gayety and mirth; a gambol: ADJ. gay; full of pranks: V. to play wild pranks; to gambol. FROL'ICKING, imp.: ADJ. playing pranks; gamboling. FROL'ICKED, pp. *-ĭkt*. FROL'ICSOME, a. *-ĭk-sŭm*, given to pranks and fun; full of mirth. FROL'ICSOMELY, ad. *-lĭ*. FROL'ICSOMENESS, n. wild pranks.

FROM, prep. *frŏm* [AS. *fram;* Icel. *framm;* Dan. *frem*, forth, forward]: away; out of; denoting distance in space or time; generally denoting separation, removal, or departure: in the following phrases—from above; from afar; from beneath; from behind; from hence, thence, or whence, —the construction may frequently be considered as *a preposition and its case:* the following phrases—from amidst; from among; from beneath; from beyond; from forth; from off; from out; from out of; from under; from within,—are simply prepositional phrases, and as such are followed by an objective case.

FROME, or FROME SELWOOD, *frōm sĕl'wûd:* parliamentary and municipal borough, in the e. of Somersetshire, England, on the Frome, a branch of the Avon, 12 m. s.s.e., of Bath. The surrounding country is picturesque; and the town, until modernized early in the present century by the formation of two wide thoroughfares, was a strange old place with narrow, crooked and steep street and lanes, many of which remain. It manufactures woolens, hats, silk, and cards for dressing woolen cloth. Frome has long been famed for its ale. Pop. about 10,000.

FROMENTIN, EUGÈNE, *e-zhān frō-mŏn-tăn*, French painter: b. La Rochelle 1820, Oct. 24; d. St. Maurice, near La Rochelle, 1876, Aug. 27. He began life as a law student but early turned his attention to landscape painting, working in the studio of Louis Sabat. In 1842 he traveled in Algeria, and it was after this journey that under the guidance of Marilhat, the painter of Oriental scenes, he resolved to work a new vein in the same department by painting the North African deserts. In 1847 he exhibited at the Salon for the first time and visited Algeria twice (1848–52). The fruits of these wanderings were not only numerous pictures, but also two literary works descriptive of his travels: *A Summer in the Sahara* (1856), and *A Year in the Sahel* (1858). The masterly analysis of ancient painting, which appears in his *Masters of a Former Day* (1876), embodies the results of his travels in Holland and Belgium (1875).

FROND, n. *frŏnd* [L. *frons*, or *frondem*, a leaf: It. *fronde*]: in *botany*, leaf of a cryptogamous plant; originally distinctive of organs in which the functions of stem and

leaf are combined, and was applied to the leaves of palms, etc.: the term *leaf* is now generally used even as to mosses, ferns, etc., and the term *thallus* as to lichens. In the case of many *Algæ*, the term F. is often used to designate the whole plant except its organs of reproduction. FRONDA'TION, n. *-dā'shŭn*, the act of stripping trees of leaves or branches. FRONDESCENCE, n. *frŏn-dĕs'ĕns*, the time or season of putting forth leaves. FROND'LET, n. a little frond. FRONDOSE, a. *frŏn'dōs*, in *bot.*, having a foliaceous or leaf-like expansion.

FRONDE, *frŏnd*, F. *frōngd:* name of a political faction in France during the minority of Louis XIV., which was hostile to the court and the prime minister, Mazarin, and caused great domestic troubles 1648 to 54. The grasping and despotic policy of Mazarin, to whom Anne of Austria, queen-regent, had abandoned the reins of government, had given offense to all classes. The princes and nobles saw themselves excluded from all high offices in the state, and their place supplied by foreigners; the parliament of Paris was threatened in its political rights, and the people groaned under the burden of taxes and administrative abuses. The parliament commenced a course of determined opposition, refusing to register the royal edicts, especially the disgraceful financial measures. Although the young king, then only nine years old, was obliged by several 'Beds of Justice' (q.v.) to compel the registration of the edicts, and to forbid the opposition of the parliament, the latter did not on that account change its bearing toward the court. Mazarin, therefore, adopted violent measures. 1648, Aug. 26, he ordered the president, Potier de Blancmenil, and the councillor, Peter Broussel, to be arrested. The people took up arms, dispersed the Swiss guard, and on Aug. 27 (*la journée des barricades*), erected barricades in the streets around the Palais Royal. The court now yielded, repealed several taxes, and promised a better administration of justice. This victory gave parliament courage; those members who continued to keep a sharp look-out on the court measures, and were styled by the adherents of Mazarin *frondeurs* —i.e., censurers (literally 'slingers')—formed the majority. The court now resolved to suppress the movement, in which the populace of the capital had also taken part, by force of arms, and, 1640, Jan. 6, removed secretly to St. Germain, leaving Paris to be blockaded by the Prince of Condé with 7,000 men. The parliament, whose cause was now publicly espoused by the Prince of Conti, the Dukes of Longueville, Beaufort, Orleans, Bouillon, Elbeuf, Vendôme, Nemours, the Cardinal De Retz, and the Maréchal de la Mothe, called upon the people to resist and even negotiated with the stadtholder of the Netherlands for an auxiliary corps. In this critical position, the court, Mar. 11, concluded a compact at Ruel, in which both parties missed their object. After the return of the court to Paris in Aug., a new turn was given to the contest, the princes of the blood disputing the power with Mazarin. This, 1650, Jan. 18, led to the sudden arrest of Condé, Longueville, and Conti. This arbitrary proceeding roused the provinces. Marshal Turenne

assumed the title of lieut.gen. of the royal army for the liberation of the princes, united himself with the Archduke Leopold, and took several fortified towns, but was finally completely defeated by Mazarin's troops at Rhetel, Dec. 15. Mazarin returned in triumph to Paris, but found all parties against him, and his removal was insisted upon so urgently, that he was obliged to release the princes, and flee to the Netherlands. A disgraceful system of intrigue was now substituted for force of arms, which totally changed the position of parties, and converted the contest which had begun for the interests of the people into a court cabal. Turenne was gained over by the queen-regent, De Retz by Cardinal Mazarin, and Condé was obliged to flee for safety into Guienne. Meanwhile, Louis XIV., who had now attained his 14th year, endeavored to induce the Prince of Condé to return; but the latter, mistrusting these overtures, repaired to Bordeaux 1651, where he had many adherents, whence he commenced a regular war against the court, which might have had dangerous consequences, had not Turenne opposed the prince. 1652, July 2, an engagement took place between the two parties in the neighborhood of Paris. Condé was on the eve of being defeated, when the gates of Paris were opened to him by the courage and zeal of his sister, the Duchess of Longueville, and thus a new turn was given to the contest. Paris itself, weary of these fruitless dissensions, now entered into negotiations with the court, demanding the final removal of Mazarin, who had meanwhile returned. This demand was complied with by Louis XIV., and a general amnesty proclaimed. Condé, who refused to enter into the compact, relying upon an army of 12,000 men placed at his disposal by Charles, Duke of Lorraine, quitted Paris Oct. 15, 1652, and repaired to Champagne; and finally, finding no one disposed to take up arms in his cause, entered the Spanish service, for which he was declared a traitor. Soon afterward, Mazarin returned to Paris, and was again intrusted with the reins of government. Thus the royal power came forth victorious from this long contest, which, though it seemed to commence for the popular interests, gradually changed into a miserable party strife among the nobles. Compare Ste-Aulaire's *Histoire de la F.* (1827, 2d ed; 1860); Fitzpatriek's *Great Condé and the F.* (1873).

FRONDEUR, n. *frŏng-dĕr'* [F. partisan of the *Fronde*; a slinger]: member of the Fronde; member of the opposition; opponent of the government.

FRONS, n. *frŏnz* [L. the forehead]: that part of the face which extends from one temple to the other, and in a vertical direction from the roots of the hair and the superciliary ridges.

FRONT, n. *frŭnt* [OF. *front*—from L. *frontem*, the forehead or forepart: comp. Pol. *przod*, forepart]: the forepart of anything; the part or place before the forepart; the face or whole face; the most conspicuous part; impudence or boldness: V. to have the face toward; to stand opposed or opposite; to stand foremost: Adj. relating to the face or

front. FRONT'ING, imp. front to front or opposite. FRONT'ED, pp. formed with a front. FRONT'LESS, a. having no front. FRONT'AGE, n. *-āj*, the front part of a building. FRONT'AL, a. *-ăl*, pertaining to or connected with the forehead: N. a small pediment over a door or window; that which hangs in front; an antependium. FRONTAL BONE: see SKULL.—FRONT'INGLY, ad. *-lĭ*. FRONT'LET, n. dim. of *front*]: a band worn on the forehead. FRONT VIEW, the representation of the front part or elevation of a building.

FRONTENAC, *frōng-tėh-nâk'*, LOUIS DE BUADE, Comte DE: 1620–1698; b. France: gov.gen. of Canada. He received a milit. education, served at the age of 15 under the Prince of Orange in Holland, became col. of a Normandy regt. when 23, and soon afterward brig.gen. In 1672 he was appointed by Louis XIV. gov.gen. of Canada and all the territory embraced in the province of New France. His administration was hampered by the jealousy of the king, insubordination of the gov. of Montreal, hostility of the Jesuits, and treachery of his colleague. In 1682 the king recalled both Frontenac and his colleague, Duchesueau, but in the following year, alarmed at the ruin Frontenac's successors had brought upon the country, he personally entreated Frontenac to resume the govt. His first movement was to restore a feeling of security from attack by the Iroquois Indians, who had burned and ravaged the upper part of the island of Montreal and spread consternation everywhere, and this he did by punishing them severely. He sent three expeditions against the English, destroyed their marine in Hudson Bay, overran Newfoundland, captured Penaquid, Casco, Salmon Falls in Me., and Schenectady, N. Y., and signally defeated the attempt of the English under Sir William Phips to take Quebec 1690. He heartily promoted the expeditions under La Salle, Marquette, and Joliet, and gave to New France a vigorous and effective government.

FRONT-END: that part of the locomotive which includes the extended outer-shell of the boiler, comprising the smoke-box and all of the appliances contained therein, such as steam and exhaust pipes, nettings, diaphragms, draft-pipes, and the base of the smoke-stack. The function of the front-end is to draw atmospheric air into the ash-pan, and thence through the grate and the fire-box, and to draw the furnace gases through the flues, and thence under the diaphragm into the smoke-stack, and force them out into the atmosphere.

FRONTIER, n. *frŏn'tēr* [F. *frontière*—from mid. L. *frŏntērĭă*, a boundary line—from *frontem*, the forepart]: the boundary of a country or state; the parts adjacent to a boundary of a country: ADJ. bordering; lying on or near the boundary.—SYN. of 'frontier, n.': border; boundary; bound; confine; precinct; limit; purlieu; marches.

FRONTIGNAC, or FRONTINIAC, n. *frŏn'tēn-yâk:* a wine made at Frontignan in Herault, France.

FRONTINUS, *fron-tī'nŭs,* SEXTUS JULIUS: Roman au-

thor in the second half of the 1st c.: d. abt. A.D. 105. He was sent to Britain A.D. 75, as governor of that island, and obtained a great reputation by his conquest of the Silures, and his vigorous maintenance of the imperial authority. He appears to have been twice consul, and to have held several other important offices. Several works are attributed to Frontinus, only two of which are certainly genuine, *Strategematicon*, treatise on the Art of War, in four books; and *De Aquæductibus Urbis Romæ*, in two books. The best edition of the first is that of Oudendorp (reprinted with emendations 1779); of the second, that of Dederich (Wesel 1841). *De Aquæductibus* is an important contribution to the history of architecture.

FRONTISPIECE, n. *frŏn'tĭs-pēs* [F. *frontispice*—from mid. L. *frontĭspĭc'ĭŭm*, the forefront of a house—from L. *frons* or *frontem*, the forepart; *spĕc'ĭō*, I view]: the ornamental illustration or engraving which faces the first page or title of a book; the part which first meets the eye.

FRONTO, *frŏn'to*, Marcus Cornelius: born at Cirta, in Numidia; went to Rome in the reign of Emperor Hadrian, where he soon obtained high reputation as a teacher of eloquence; died, it is supposed, abt. A.D. 175. Antoninus Pius intrusted to him the education of Marcus Aurelius and Lucius Verus, both of whom always retained the warmest admiration of their preceptor. Fronto gradually rose to the highest offices of the empire, and became very wealthy. For a long period nothing was known of Fronto as an author, except from a few fragments of a grammatical treatise (*De Differentiis Vocabulorum*); but in 1814, Cardinal Angelo Mai discovered in the Ambrosian Library at Milan a palimpsest, which, being deciphered, was found to contain a considerable number of Fronto's letters with some short essays. These were published by Mai 1815; and in the following year an edition was published at Berlin by Niebuhr, who wrote a critical preface, and also printed the commentaries of Buttmann and Heindorf. A few years afterward, Mai found in the library of the Vatican at Rome another palimpsest containing more than 100 of Fronto's letters. The result was a new edition of Fronto by Mai (Rome 1823), embodying the new discoveries, republished at Celle in Germany (1832). The contents of these letters are on the whole unimportant, though they help to confirm the good opinion which history has formed of Emperor Marcus Aurelius; the style is vapid and declamatory.

FRONTON, n. *frŏng'tŏng* [F.]: the decorated entrance to a building, consisting of a cornice supported by consoles and surmounted by a pediment.

FRONT-RAIL: a single-bar attachment which extends from the front of each of the main frames of a locomotive to the front bumper.

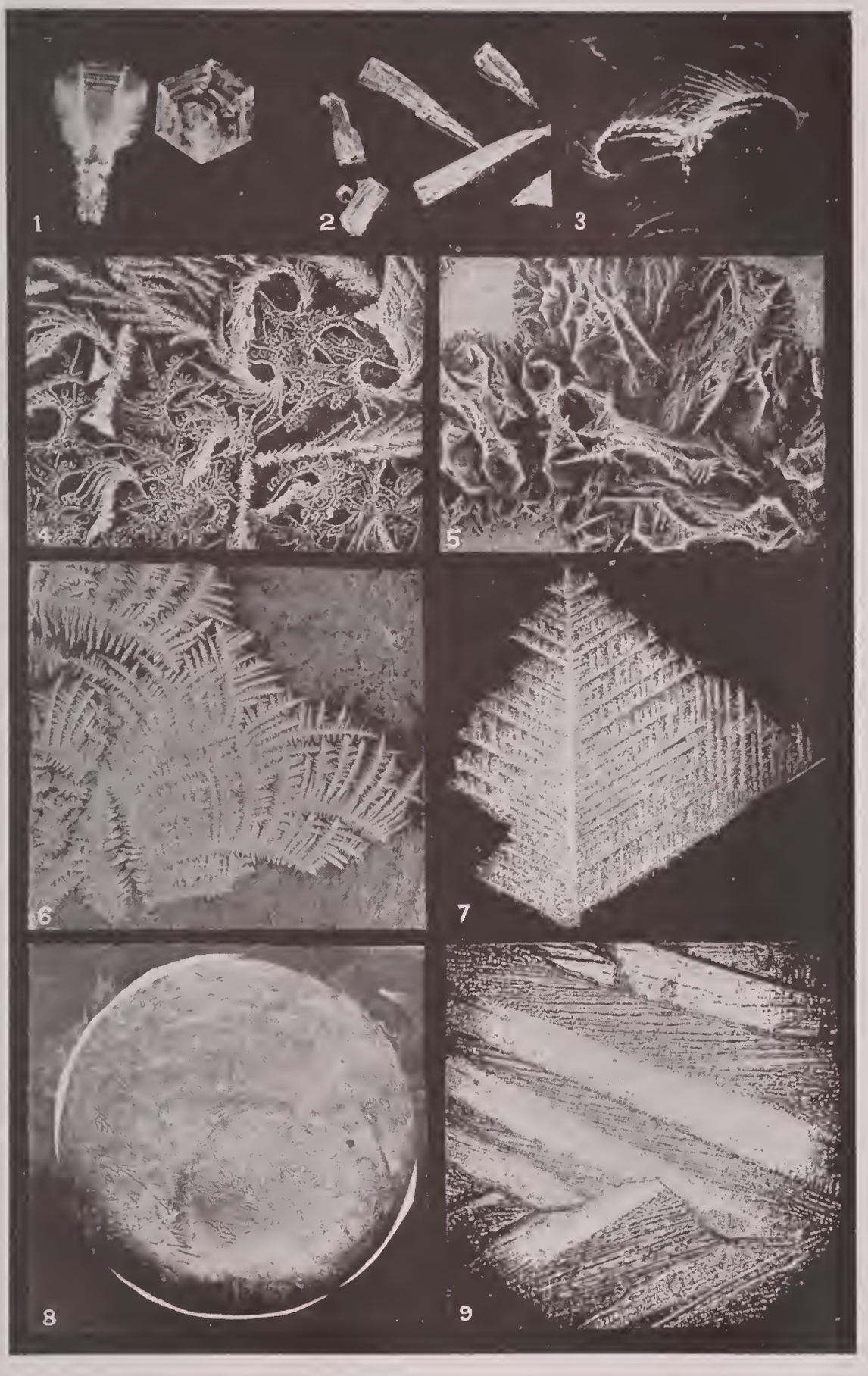
FRORE, a. *frōr*, or Frory, a. *frō'rĭ* [AS. *freosan*, to freeze; *froren*, pp. frozen: Dut. *vroor*, frozen]: in *OE.*, frosty. Frorn, a. *frŏrn*, frozen.

FROST.

FROST, n. *frŏst* [AS. *forst;* Dut. *vorst;* Icel. *frost;* Ger. *frost,* frost: F. *frisson,* a shudder: from *froze,* the pt. of *freeze,* which see]: the power, act, or state of freezing; frozen vapor or dew, as *hoar-frost:* V. to adorn with the appearance of frost. FROST'ING, imp.: N. the sugar composition resembling hoar-frost, used to cover cakes, etc. FROST'ED, pp.: ADJ. covered with anything resembling hoar-frost in color or form. FROSTILY, ad. *frŏs'tĭ-lĭ.* FROS'TINESS, n. FROSTY, a. *frŏs'tĭ,* containing frost; very cold; freezing. FROST-BITE, the effects of excessive cold on a part of the surface of the body, resembling a burn. FROST-BITTEN, affected by frost. FROST-BOUND, bound or confined by frost. FROST-WORK, work resembling hoar-frost on plants. Meteorologists distinguish frosts as follows: SILVER FROST OR SILVER THAW. This refers to an accumulation of frost on the limbs of trees, etc. The external appearance is silvery white and rough. It is observed during foggy weather when the temperature is below freezing or else after a cold spell when the temperature rises rapidly and stones, etc., remain colder than the air. GLAZED FROST: this refers to an accumulation of ice on trees. The external appearance is smooth and transparent. In using the symbols for silver frost and glazed frost these terms are to be considered as descriptive of the resulting phenomena no matter how they are brought about, therefore the definitions avoid any statement as to the conditions attending the formation of the deposits. The same rule applied to the use of the symbol for hoar-frost. ⌙ HOAR-FROST, ⌙° light hoar-frost, ⌙² heavy hoar-frost, injurious to vegetation. The expression frosty weather refers to the low temperature as such, but the expression hoar-frost refers to the deposit of fine ice crystals upon the surface of solids in the open air. Hoar-frost is generally deposited on objects under a clear sky at night. DEGREES OF FROST. An old way of indicating the fall in temperature below the freezing point or 32° F. It is no longer considered a proper mode of expressing the condition.

FROST: popular name for the effect of a freezing temperature on the surface of the earth. A more scientific use restricts the application of the term to the above when the cold is produced in principal measure by radiation from the earth's surface. Dew is moisture deposited from the air as it becomes chilled by contact with the cold earth. If the cold is intense enough, instead of liquid dew solid ice is formed which is termed frost. Frost is not generally frozen dew as frequently stated. The moisture in the air by refrigeration often passes at once to the solid state and then appears as hoar-frost. Everything that favors radiation of heat tends to produce frost if the general temperature is low enough. A clear sky with a slight breeze has this tendency; dark soils, and the leaves of plants, are good radiators and hence show it readily. Radiation of heat may naturally be prevented by spreading a screen over the surface. Hence garden-

WINDOW AND HOAR FROST.



1. Columnar window frost.
2. The same, cup-like.
3, 4, 5, 7. Crystalline window frost.
6. Branching hoar frost.
8, 9. Membranous window frost, highly magnified.

ers often protect their plants at night by stretching canvas screens over a framework that supports them a short distance above the soil. Clouds have the same effect; a cloudy night is not favorable to the production of frost.

In California, Florida, France, and elsewhere, many improvements have been made in the past few years in methods of protecting both citrus and deciduous fruits from injury by frost. Especially in California have these methods attained a high degree of success. Frost fighting is described in official bulletins issued by the United States Weather Bureau. The principles involved in frost fighting are, as given in Bulletin No. 29, smudging, mixing the air by stirring or fanning, warming, adding water vapor, irrigation, spraying and the use of heated water.

The same general principles used in the protection of orchards apply in the protection of gardens, both vegetable and flower. A clear, still night following a period of windy weather is one to be guarded against, particularly if the movement of the air in the given locality is such as to result in the settling of cold dry air in the hollows or valleys. The formation of frost is essentially a problem in air drainage, and if by any means we can prevent pools, streaks or basins of stagnant, cold, dry air, we can prevent, to a large degree, what is called frost and its injurious effects. As said above, frost is the water vapor of the air deposited upon plants at a temperature below 32° F. or 0° centigrade. *The damage to plants is caused by the falling temperature and not by the formation of the ice crystals.* The frost itself simply indicates the changes in temperature; its action is indeed, preventive.

It can not be emphasized too clearly that it is the low temperature and not the solidification of the water which does the damage. If there be but little vapor in the air there will be but a light frost apparent, and yet the temperature may be so low as to cause great injury. The so-called hard, dry frost, also called black frost, does, as is well known, even more injury than heavy frosts. Water vapor at 25° F. completely saturated weighs 1.6 grains per cubic foot. In the fall from 32° to 25° nearly half a grain per cubic foot, if the saturation were 100 per cent., would be condensed, appearing in visible form as a frost flake. A certain amount of heat was given off in the transformation of this invisible water vapor into ice, and an exactly equal amount of heat (known as the latent heat of vaporization) will be in turn required to change this frost flake back into vapor. We give special attention to this point because it would appear theoretically that the secret of successful protection of garden truck and delicate flowers will be found in this action of water, both in setting free heat at the time when the temperature is falling, and on the other hand in using up heat and thus acting as a retard or brake when the temperature begins to rise quickly.

It is now quite generally believed that as much injury results from the sudden warming up of the dormant and

thoroughly chilled flower or vegetable as from the chilling itself. In the work of protecting fruits from frost it has been found very necessary to interpose some screen early in the morning between the sun's rays and the frosted fruit. With flowers and garden truck this can be much more easily accomplished than with fruit. In this respect the gardener has a decided advantage over the orchardist. The following is an excellent statement of how the plant is injured:

How Frost Injures Plants.—Low temperature congeals the watery part of the cell sap and also the intercellular water content of the plant. Within certain limits this is not or may not be injurious, providing the protoplastic contents of the cell are able to absorb the water and do this before the cell structure collapses as a result of insufficient cell turgor. Frequently the frosting of plants is followed by a sudden rising of temperature, in which case much of the water which was part of the cell sap in the normal condition of the plant escapes through the cell wall into intercellular spaces, or even from the plant entirely, and thus, the protoplasm of the cell being unable to assume its normal condition, becomes disorganized and decomposition follows. (Prof. E. R. Lake in the Oregon climate and crop bulletin, July, 1900.)

Methods of Protecting.—Every fruit grower should put himself in communication with the nearest center of distribution of weather forecasts. If possible he should be in daily communication with some Weather Bureau office. Whenever frost warnings are issued for his locality he should carefully determine the temperature and dew-point, as elsewhere described, frequently during the late afternoon and night. A good outfit consists of a metallic thermometer so arranged as to automatically close an electric circuit and ring an alarm whenever the temperature of the air reaches 32°. In addition to a reliable sling psychrometer there should be some small device for testing the motion of the gentle air currents in the orchard. Too much attention can not be given to this question of air motion. Many smudging devices have failed to be effective because of a slow movement of the smoke away from the orchard.

Protective Methods Based on Mixing the Air.—It is well known that lowlands are visited with frost while hillsides and hilltops escape. Every fruit grower should study the topography of his land and plant accordingly. Windbreaks are, as a rule, considered detrimental. No hard and fast rule, however, can be laid down.

Protective Methods Based on Warming the Air.—A large number of small fires, advantageously placed, will raise the temperature of the air several degrees. This method meets with most favor in southern California. The temperature can be raised certainly 3° or 4° with from 20 to 40 of these baskets to the acre. It has been suggested that a number of small oil lamps be used with success for this purpose. Oil pots have been used and make a

horter fire, but the deposit of lamp black upon the fruit is objectionable. Some cheap modification of the ordinary plumber's furnace might possibly be devised, which, by means of a moderate blast, would produce a high temperature.

Protective Methods Based on Cloud or Fog Formation.—Damp straw, old wood, prunings, manure, etc., when burned briskly furnish an effective smoke, and if the material while burning is doused with water the result is a dense steamy smoke, which, while trying to human lungs, serves as a screen to prevent loss of heat by radiation, and as a barrier between the chilled fruit and a sudden application of heat at the time of sunrise. Wet smudging has been tried in many ways with varying results. There are many reports of failure and, on the other hand, some definite results, showing the good accomplished by this method. Here, as in all other methods of protection, much will depend upon a careful study of the local conditions. Many a farmer smudges so that some neighbor gets the benefit of his work, while his own fruit remains unprotected. All motion of the air should be noted carefully, and this is sometimes difficult where the smoke is very dense. In some orchards sacks of old straw soaked with oil are so distributed as to be available for quick lighting. Portable smudges have also been devised.

Protective Methods Based on Irrigation.—Of all methods proposed for the protection of fruit, excepting wire baskets, irrigation has the largest amount of evidence in its favor. It has been tried in many different places with different crops and has generally given satisfaction. Where water is not very plentiful, and this is the case strangely enough in some fruit sections, the method is much in vogue.

Spraying.—After frost, or rather just before a frost has ended, a spraying device can be used to advantage. Its chief function is to prevent a too rapid warming of the chilled fruit. It is said by horticulturists that even the light coating of ice formed in this way does not seriously damage the fruit. It is very likely that the latent heat of solidification set free by the change from water to ice may play a helpful part; but the chief effect is to prevent a too rapid thawing. In other words, both heat and water should be supplied to the chilled plant slowly and according to the plant's ability to make good use of the same.

Protective Methods Based upon Screening or Covering.—All screening or covering devices are in effect modified hothouses, and there is no question but that a thorough protection can be accomplished. The expense is the one objection. Screens are made of light materials, namely, canvas, muslin, or light woodwork, and have been used with considerable success. There is no question as to the value of the protection, but the expense is considerable, averaging perhaps $400 to the acre. This lath covering may be considered as forming a well-ventilated hothouse.

FROST'-BITE: effect of cold depressing the vitality of a

part or the whole of the body. The frost-bitten part is at first blue and puffy, from the current of blood through it being suspended; then should the cold be continued, it becomes pallid, and the painful tingling gives place to numbness and insensibility, and finally to actual death or mortification. Although a sudden violent application of cold may cause death of the tissues, by reducing the temperature to a degree incompatible with animal life, the most common cause of the destructive effects of frost-bite is undoubtedly the excessive reaction which occurs on sudden removal of the cold or application of heat; this is especially the case with moist cold. Baron Larrey believed that 'cold was merely the predisposing cause of frost-bite, and mentions that after the battle of Eylau the French soldiers did not experience any painful sensations during the severe cold varying from 10° to 15° below zero of Reaumur's thermometer; but when the temperature rose from 18° to 20°, they felt the first sensations of cold, and applied for succor, complaining of acute pains in their feet, and of numbness, heaviness, and prickings in the extremities. The parts were scarcely swollen, and of obscure red color. In some cases, a slight redness was perceptible about the roots of the toes, and on the back of the foot; in others, the toes were destitute of motion, sensibility, and warmth, being already black, and, as it were, dried.' Those of the men who indulged in the warmth of the bivouac fires suffered from frost-bite in much larger proportion than their more hardy comrades. Cases of frost-bite in this country are not usually severe, the most common being chilblains (q.v.); though some severe cases and even fatal cases are reported every winter; and severe cases present themselves at the hospitals in the persons of houseless, ill-nourished unfortunates, whose constitutions have in many instances been enfeebled by strong drink.

The treatment of frost-bite consists in coaxing back by degrees the vitality of the part: this is most prudently effected by friction, at first with snow, then with water at ordinary temperature, no warmth being applied for some time. As the coldness subsides, the painful tingling returns, then redness and heat; in a short time the latter will be above the natural standard, and if not moderated the part will inflame, and perhaps mortify. It is well to remember that the part need not have been actually frozen for these symptoms to occur. The person with languid circulation who, coming home with cold, wet feet, places them before the fire or in warm water, may be 'frost-bitten' to all intents and purposes.

FROST, Arthur Burdett, American illustrator and author: b. Philadelphia 1851, Jan. 19. He studied under Thomas Eakins in the Academy of Fine Arts, Philadelphia, and coming to New York secured employment on the *Graphic*, and later entered the studio of Harper and Brothers. In 1877 he went to England, and in 1900 he exhibited at the Paris Exposition. His early work was full of interest and attracted much attention, and

his later work showed the spirit of the true artist. He has published: *Stuff and Nonsense* (1888); *Bull Calf and Other Tales* (1892); *Sports and Games in the Open;* and *Golfers' Alphabet.*

FROST, William Goodell, American educator: b. Le Roy, N. Y., 1854, July 2. He was graduated at Oberlin College in 1876, and afterward studied at Harvard and Göttingen, Germany. He was appointed professor of Greek in Oberlin College in 1879, and president of Berea College 1893. He has published: *Inductive Studies in Oratory; Greek Primer.*

FROSTBURG, *frŏst'bŭrg:* village of Alleghany co., Md.; on the Cumberland and Piedmont railroad, 17 m. w. of Cumberland. It is between Savage and Davis mountains, on a plateau 1,255 ft. above Cumberland, 1,792 ft. above tide water, and directly over the great coal basin of w. Md. The city contains numerous churches, iron foundries, and a fire-brick factory derives its chief importance from coal-mining. The city controls its own water supply. The government is controlled by a mayor, chosen annually, and a city council, both provided for under the charter of 1870. Pop. (1910), 6,028.

FROST-COCKS: cocks provided for the purpose of admitting steam from the boiler of a locomotive to the feed-pipes, to prevent them from freezing in cold weather.

FROSTING: a finish put upon the exposed surfaces of machine parts for ornamental purposes only. It is effected by scraping with a scraper, or with a small piece of oil stone, a series of the lightest of cuts or scrapings upon the surface of the metal. These cuts are inflicted at different crossing angles from which the light is reflected and produce a very beautiful effect.

FROST-PLUGS: plugs screwed into the pump chambers and pump cages of a locomotive to allow the water to drain out and prevent them from freezing.

FROTH, n. *frŏth* [Icel. *frauth,* scum: Dan. *fraade;* Sw. *fradga,* froth: Low Ger. *frathen,* steam, vapor: W. *ffrydio,* to stream, to gush]: the small bubbles formed on the surface of a liquid by fomentation or by agitation; foam; a showy pretense of knowledge or ability; anything light or unsubstantial: V. to throw up foam or bubbles. Froth'ing, imp. Frothed, pp. *frŏtht.* Frothy, a. *frŏth'ĭ,* full of froth; consisting of light bubbles; light; empty; unsubstantial. Froth'ily, ad. *-ĭl.* Froth'iness, n. the state of being frothy; emptiness.

FROTH'-FLY, or Froth'-Hopper, or Frog'-Fly, or Frog'-Hopper: common names of those insects of which the young—larvæ and pupæ—are found in a frothy exudation on plants. They form the family *Cercopidæ* of the order *Homoptera,* and are allied to *Aphides,* and still more nearly to *Cicadas* and Lantern-flies. The larvæ and pupæ differ little in appearance from the perfect insect except that it possesses wings, which are four in number, and

large. The frothy exudations in which they live are produced from the juices of the plants on which they are found; and as they are often in great numbers, crops of various kinds are not unfrequently destroyed or much injured by them, the plants being weakened by loss of sap. They have a proboscis adapted for piercing the bark of the plants on which they feed. They all are small and have considerable leaping powers. The frothy exudation is called sometimes CUCKOO-SPIT, sometimes FROG-SPITTLE, from fancies as to its origin. It is sometimes so abundant, particularly on willow-trees, that persons walking beneath are wetted by its continual dropping. In tropical countries, the *Cercopidæ* are still more plentiful. Some of the tropical insects of this family are remarkable for their extraordinary forms, resulting from peculiar developments of the first segment of the thorax. This is particularly the case in the genus *Bocydium*, of which two species are here figured.

FROTHINGHAM, *froth'ing-am*, OCTAVIUS BROOKS: author: son of NATHANIEL LANGDON F., D.D.; b. Boston, 1822, Nov. 26; d. 1895, Nov. 27. He graduated at the Boston Latin School, Harvard Univ. 1843, and Cambridge-Divinity School 1847, was ordained pastor of the North (Unit.) Church, Salem, Mass., 1847, Mar. 10; was pastor in Jersey City 1855–59; and of the Third Unit. Congl. Church (which he organized in New York, 1859) until the society was dissolved 1879. He spent 1879–81 in European travel, and on his return settled in Boston, and applied himself to literature. He was one of the founders (1867) and he was pres. from its organization of the Free Religious Assoc. (see FREE RELIGION), and he actively advocated rationalistic ideas in theology. Of late years his views seemed not so extreme as formerly. Frothingham was art critic of the New York *Tribune* for a year, was a contributor to the Boston *Index*, the free religious organ, from 1880; he published nearly 200 sermons and lectures, and wrote *Stories from the Lips of the Teacher* (1863); *Stories of the Patriarchs* (1864); *A Child's Book of Religion* (1866); *The Religion of Humanity* (1873); *The Life of Theodore Parker* (1874); *The Safest Creed* (1874); *Transcendentalism in New England* (1876); *The Cradle of the Christ* (1877); *Life of Gerrit Smith* (1878); *Life of George Ripley* (1882); and *Memoir of William Henry Channing* (1886).

FROUDE, *frôd*, JAMES ANTHONY, LL.D.: English historian: 1818, Apr. 23—1894, Oct. 20; b. Totness. He studied at Oriel College, Oxford, where he took his degree 1840; and 1842 was elected a fellow of Exeter College. Having abandoned his original intention of entering the ministry, he published, 1847, a volume of stories, entitled *The Shadows of the Clouds;* and two years later, *The Nemesis of Faith*, a work in which the solemnity and sadness of religious skepticism are relieved by a singularly tender and earnest humanity. The book was written

with great and even startling power, and not only cost Froude his fellowship, but also a situation to which he had just been appointed in Tasmania. Froude, for the next few years, employed himself in writing for *Fraser's Magazine* and the *Westminster Review*. His *History of England from the Fall of Wolsey to the defeat of the Spanish Armada*, appeared 1856–69. The peculiarity of this work consists in its use of the state documents of the time, the study of which led Froude to reverse not a few historical verdicts, especially that upon Henry VIII. The justness of his views on these and other points has been keenly disputed. Four volumes of *Short Studies on Great Subjects* appeared 1867–82. Froude was elected rector of St. Andrews Univ. in 1869, and received the degree LL.D. For a short time he was editor of *Fraser's Magazine*. *The English in Ireland in the Eighteenth Century* was published 1874 (new ed. 1881). In 1874, and again in 1875, Froude visited the British s. African colonies on a mission from the home government; the result is embodied in his *Two Lectures on S. Africa* (1880). As Carlyle's literary executor, Froude edited his *Reminiscences* (1881), and Mrs. Carlyle's *Letters* (3 vols. 1882); and in 1882 and 1884 he published the biography of Carlyle in four volumes. By giving to the world the copious personal criticism and unpleasant family details contained in these works, he provoked doubts as to his discretion, and in some quarters severe censure. *Oceana* (1886), gives some of his observations during a voyage round the world, dealing mainly with Victoria, New South Wales, and New Zealand. He was appointed prof. hist. Oxford 1892.

FROUNCE, v. *frowns* [F. *froncer*, to plait, to wrinkle—from mid. L. *frontĭārĕ*, to wrinkle—from L. *frontem*, the forehead, the front: Dut. *fronsen*, to plait]: to frizzle; to form wrinkles in or upon. FROUN'CING, imp. FROUNCED, pp. *frownst*. *Note.*—Skeat says FROUNCE is the older form of FLOUNCE.

FROUZY, or FROUSY, a. *frow'zĭ* [probably from OE. *frow;* Ger. *frau*, a woman, as a contemptuous name]: fetid; musty; dim; cloudy; dirty and untidy.

FROW, n. *frow* [Ger. *frau;* Dut. *vrouw*]: a woman; a dirty woman.

FROW, n. *frō:* a cleaving tool used by coopers.

FROWARD, a. *frō'wėrd* [AS. *fram*, Icel. *frá*, Dan. *fra*, from; and *ward*]: perverse; refractory; unyielding; disobedient. FRO'WARDLY, ad. *-lĭ*. FRO'WARDNESS, n. peevishness; perverseness.—SYN. of 'froward': peevish; petulant; cross; wayward; perverse; untoward; unyielding; ungovernable.

FROWN, n. *frown* [OF. *frogner*, to look sourly on: prov. Sw. *fryna*, to grin: It. *grignare*, to snarl]: a contraction of the forehead, expressing anger or dislike; a look expressing displeasure: V. to express displeasure or anger by contracting the forehead; to express displeasure in any

significant way; to scowl at or on. FROWN'ING, imp.: ADJ. knitting the brows in anger or displeasure. FROWNED, pp. *frownd*. FROWN'INGLY, ad. *-lĭ*, with a look of displeasure; sternly.

FROWY, a. *frow'ĭ* [Gael. *frogach*, fenny, marshy]: in *OE.*, damp; clammy; marshy.

FROZE, pt. *frōz* [see FREEZE]: did freeze. FROZEN, pp. a. *frō'zn*, congealed by cold; frosty; chill. FROZEN ZONES, the extreme n. and s. zones of the earth, called respectively the arctic and antarctic.

FROZEN STRAIT: body of water 15 m. wide, separating Southampton Island, in the north of Hudson Bay, from Melville Peninsula. It is almost constantly impervious to navigation.

FRUCTIDOR, *früc-tĭ-dōr* (Eng. 'fruit-month'): name given in the republican calendar of France to the period Aug. 18—Sep. 16: see CALENDAR.

FRUCTIFY, v. *frŭk'tĭ-fī* [L. *fructifier*—from mid. L. *fructĭfĭcārĕ*, to be fruitful—from L. *fructus*, fruit; *făcĭō*, I make]: to render productive or fruitful; to bear fruit. FRUCTED, in *her.*, applied to trees represented as bearing fruit. FRUC'TIFYING, imp. FRUC'TIFIED, pp. *-fīd*. FRUC'TIFICA'TION, n. *-fĭ-kā'shŭn* [F.—L.]: the act of rendering productive of fruit; in *cryptogamic botany*, those parts of a plant which embrace the organs of generation—i.e., flowers and fruit. FRUCTIF'EROUS, a. *-tĭf'ĕr-ŭs* [L. *fĕrō*, I bear]: bearing fruit. FRUCTESCENCE, n. *frŭk-tĕs'ĕns*, the time when the fruit of a plant arrives at maturity.

FRUCTOSE, or FRUIT'-SUGAR (known also as INVERTED SUGAR): a substance occurring in association with glucose, or (according to the recent investigations of Buignet) with cane-sugar in many ripe acidulous fruits. In its composition, and in most of its properties, it closely resembles glucose, from which, however, it differs (1), in being incapable of crystallization; and (2), in its action on polarized light; while both glucose (or grape-sugar) and cane-sugar exert a right-handed rotation upon a ray of polarized light, this variety of sugar exerts a left-handed rotation: and hence the term *inverted* has been applied to it. The composition is represented by the formula $C_{12}H_{24}O_{12}$. When boiled with dilute acids, fructose combines with the elements of water, and passes into glucose. A similar passage of this substance into glucose sometimes occurs spontaneously, as is seen in the gradual crystallization of the sugar in dried fruits. Fructose appears to be procurable only from cane-sugar (or sucrose) by the action either of acids or of a peculiar albuminous ferment which exists in the juice of many ripening fruits.

FRUGAL, a. *frô'găl* [F. *frugal*—from L. *frugālĭs*, thrifty: It. *frugale*]: economical in living; not lavish; sparing. FRU'GALLY, ad. *-lĭ*. FRUGAL'ITY, n. *-găl'ĭ-tĭ* [F. *frugalité*]: prudent economy; a prudent and sparing use of anything; thrift.—SYN. of 'frugal': economical; saving; thrifty; parsimonious.

FRUIT, n. *frôt* [F. *fruit*—from L. *fructus*, fruit, produce—from *frŭŏr*, I enjoy: It. *frutto*]: whatever the earth produces for food, clothing, or profit: the edible produce of a tree or plant; that which is produced; effect, good or ill; advantage; profit: V. to produce fruit. FRUIT'ING, inp.: ADJ. producing fruit; pertaining to fruit: N. the bearing of fruit; offspring. FRUIT'AGE, n. *-āj*, the fruit of one season, as the apple or vine. FRUIT'ERER, n. *-ėr-ėr*, a dealer in fruits, as apples, oranges, grapes, strawberries, etc. FRUIT'ERY, n. *-ėr-ĭ*, a place for keeping fruit; fruit collectively taken. FRUIT'FUL, a. *-fûl*, producing fruit; fertile; abundant. FRUIT'FULLY, ad. *-lĭ*. FRUIT'FULNESS, n. productiveness; fertility. FRUIT'LESS, a. barren; unprofitable; useless. FRUIT'LESSLY, ad. *-lĭ*, FRUIT'LESSNESS, n. barrenness. FRUITY, a. *frôt'ĭ*, having the odor, taste or appearance of fruit. FRUIT'INESS, n. FRUTICIST, *frôt'ĭ-sĭst*, one who favors classifying plants according to their fruit; a fruitist. FRUIT-BEARING, producing fruit. FRUIT-INSPECTOR, a person officially appointed to examine all fruit brought into the market. FRUIT-SUGAR (see FRUCTOSE). FRUIT-TREE, a tree producing fruit, as opposed to a timber-tree.—SYN. of 'fruitful': prolific; productive; fecund; plentiful; rich; plenteous;—of 'fruitless': vain; ineffectual; barren; abortive; idle; profitless.

FRUIT: in the botanical use of the term, in phanerogamous plants, a mature ovary containing a seed or seeds; and in cryptogamous plants, a spore-case (*sporangium* or *theca*) containing spores. Other parts of the flower, most frequently the calyx, sometimes remain after flowering is over, undergo a further development, become incorporated with the ovary, and form part of the fruit. The development of the fruit in phanerogamous plants commonly depends upon the fertilization of the ovules, and when this has not taken place, the flow of sap to the ovary usually soon ceases, and it drops off with all the other remains of the flower. There are exceptional cases of seedless fruits, as seedless oranges, bananas, grapes, barberries, cucumbers, etc.

It was formerly believed that seed never develops without fertilization, although it has been known for a considerable time that some seedless fruits, as for example, certain forcing cucumbers, may develop even without pollination. While it appears that in most cases pollination is prerequisite to the setting of fruit, even though the fruit be seedless, it is now known that by parthenogenesis certain plants may even develop good viable seed without pollination, as for example, dandelion and hieraceum.

The fruit, like the ovary, may be composed of one carpel, or of more than one. But the fruit sometimes differs from the ovary, through the development of some of the parts, and the non-development or obliteration of others; so that an ovary with several cells may be converted into a one-celled fruit: and of several ovules, all but one may become abortive, so as to produce a one-seeded fruit. Thus the three-celled ovary of the oak and the hazel with two ovules

in each cell, becomes by the non-development of two cells and five ovules, a fruit with one seed; and the two-celled ovary of the ash, and the three-celled ovary of the cocoa-nut, likewise produce one-celled and one-seeded fruits. The number of cells may also be increased by the formation of false dissepiments. The structure, too, may be rendered more complex by the development of accessory parts, and is usually profoundly modified in ripening, these changes being in direct relation to the dispersal of the seeds.

All that is external to the proper integuments of the seed in the ripe fruit is called the *pericarp* [Gr. *peri*, around; and *karpos*, fruit]; and this, which varies extremely in size and other characters, usually consists of three layers, the outermost of which is called the *epicarp* [Gr. *epi*, upon]; the middle one, the *mesocarp* [Gr. *mesos*, middle], or sometimes the *sarcocarp* [Gr. *sarx*, flesh]: and the innermost,the *endocarp* [Gr. *endon*, within]. These parts show great variety, but it is generally the mesocarp which becomes succulent or fleshy, as in the peach, cherry, plum, and other drupes; and in the pear, apple, and other pomes. In drupes, or stone-fruits, the endocarp is the hard shell which immediately covers the seed; in pomes, it is the scaly lining of the seed-bearing cavities in the centre; in both drupes and pomes, the epicarp is the outer skin. So in melons, cucumbers, and gourds, the succulent part is the mesocarp, greatly developed, with a thin epicarp and a thinner endocarp. In the orange, however, and all of that family, the epicarp and mesocarp together form the rind, whilst the pulpy cells belong to the endocarp. In berries, as the gooseberry, grape, etc., the pulpy matter does not belong to any of the layers of the pericarp, but is formed from the placentas of the seeds.

When the fruit, as the fully developed ovary, is considered as a modified leaf or leaves, the epicarp is viewed as representing the epidermis of the lower surface, the endocarp the epidermis of the upper surface, and the mesocarp the substance (*parenchyma*) of the leaf. The midrib of the leaf is traced in the *dorsal suture* of the fruit or of each component carpel, and the *ventral suture* is formed by its folding together and the conjunction of its edges. The dorsal and ventral sutures are very obvious in the pods of peas, beans, etc., and even in fruits formed of several carpels intimately combined, they often become very apparent when the ripened fruit opens to allow the escape of the seeds. The opening or *dehiscence* [Lat. *dehisco*, to open] of fruits takes place in various ways; thus the fruit sometimes resolves itself into its original carpels by separation through the *dissepiments*, which divide into two plates forming the sides of the valves, and the carpels further open by their sutures; the pericarp sometimes splits at once by the dorsal sutures of the carpels; sometimes it divides transversely, and throws off a lid; sometimes it opens more partially by pores, etc. Many fruits, however, are indehiscent, some having a very hard pericarp, as nuts, and some having a soft pericarp and much pulp. The decay of the pericarp is in these

1. View in a California Orange Grove.
2. Packing Fruit in a Mountain Peach Orchard.

cases necessary to the liberation of the seeds, except when this is accomplished by such means as the F. becoming the food of animals, by which also the seeds of plants are often widely distributed. The decay of the pericarp seems intended, in many cases, to provide the first nourishment for the young plants which spring from the seeds.

A classification of the different kinds of fruits is extremely difficult, though they afford characters of great importance in descriptive and systematic botany. A convenient primary division of fruits is into those formed from one flower, and those formed by incorporation of the ovaries of many flowers. Fruits formed from one flower, by far the most numerous of these two classes, are divided into *apocarpous*, and *syncarpous*, or into *apocarpous*, *aggregate*, and *syncarpous*. Apocarpous fruits are formed of one carpel, and are either dry or succulent, dehiscent or indehiscent, one-seeded or many-seeded. Aggregate fruits, sometimes included among the apocarpous, are formed of several, or many free carpels; sometimes dry, sometimes succulent; sometimes arranged on a convex or elevated receptacle; which becomes succulent in the strawberry, and constitutes the edible part of the fruit; sometimes within a concave receptacle covered by the enlarged tube of the calyx, as in the rose. Syncarpous fruits are formed of several carpels, intimately united in their mature state, so as to form a berry, capsule, pome, silique, etc. Syncarpous fruits sometimes so completely resolve themselves into their original carpels, that these may be regarded as becoming separate achenia. Fruits formed by incorporation of the ovaries of many flowers (collective or anthocarpous fruits) are sometimes dry, as the cones of firs; sometimes succulent, as the pine-apple, the mulberry, and the fig. For further notice of different kinds of fruits, see particular titles under which they are described, as achenium, berry, capsule, drupe, nut, pome, pod, silique, etc.; also titles of the plants which produce them.

A few plants, particularly the *Coniferæ* and *Cycadaceæ*, produce seeds really naked or destitute of pericarp. Many other seeds were formerly often described as naked, in which the pericarp exists intimately incorporated with the seed, as the seeds of grasses, *Borragineæ*, *Labiatæ*, *Umbelliferæ*, etc. Their real nature is often made apparent by some trace of the style.

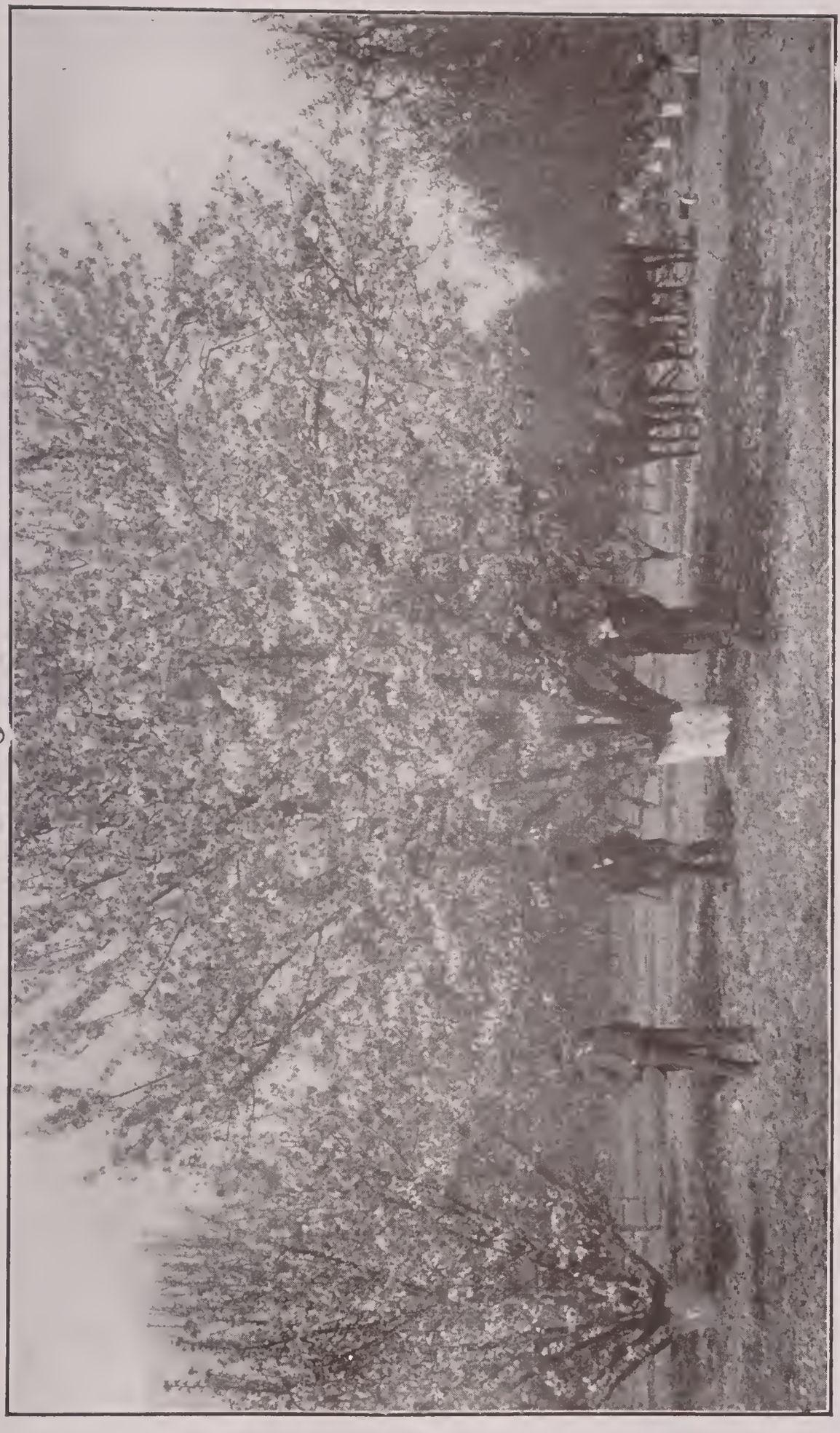
The production of ripe F. is exhaustive to the energies of a plant, and plants ordinarily annual may be preserved in life for several years by preventing it. Very young fruit-trees generally fail to bring fruit to perfection, and the first flowers of melons and gourds are often abortive; while, on the contrary, any circumstance that favors an accumulation of sap in a particular season, tends to render fruit-trees unusually productive in the next season, as when all blossoms of a year are killed by frost, or when, from the coldness of the previous summer, flower-buds have not been formed in abundance. While the vital energies of a plant are directed mainly toward the increase of its size, flower-

buds are sparingly formed or not at all, as is often the case with fruit-trees growing very luxuriantly; and various modes are adopted to cause the production of flower-buds and of fruit by checking this luxuriance of growth, as by root-pruning, by cutting into the stem to a moderate depth, or by taking off portions of the bark of the stem. Grafting (q. v.) is also of use in this respect, as well as for the propagation of improved varieties of fruit-trees, which do not come from true seed.

In a very immature state, fruits are in general green and soft, and decompose carbonic acid gas in the sunlight, absorbing the carbon, and setting free the oxygen, like leaves and other green parts of plants. As they advance toward maturity, some of them become externally dry and hard, and cease to perform by their surface these functions of vegetation; others, as they become more succulent, change their color, and instead of absorbing carbon and liberating oxygen, absorb oxygen from the atmosphere, and exhale carbonic acid.

It would not be easy to enumerate the peculiar substances produced in fruits. Different parts of the same fruit are often extremely different from one another, as the milk and the kernal of the cocoa-nut, its hard shell, and its fibrous husk. Seeds are indeed generally very different in all their qualities from the pericarp or the pulp by which they are surrounded, and the integuments of the seed often not less different from the embryo; of all which a ready illustration may be found in the apple or the grape. The most different chemical products of vegetation are sometimes found in different parts of the same fruit, giving them the most varied qualities, as wholesome and poisonous; the succulent part of the fruit from the kernel of which strychnia is obtained, is said to be harmless; and the seeds of plums contain so much hydrocyanic acid, that to eat many of them would be dangerous; the capsule of the poppy yields opium, but its seed contains nothing of the kind, and is bland and nutritious, abounding in a wholesome fixed oil. The value of fruits to man—which may safely be asserted to exceed that of all other parts of plants—sometimes, as in the grain-plants, depends chiefly on the farinaceous matter of their seeds, containing starch, gluten, etc; sometimes, as in the banana and bread-fruit, on the starchy matter of the pulpy part; sometimes, as in nuts, on fixed oils; sometimes, as in many succulent fruits, on sugar and various acids, with gum, pectine, etc. Other fruits, or parts of the same fruits, are valuable for the volatile oils which they yield, and for peculiar principles capable of application to medicinal and other uses, or making them capable of being used as condiments, perfumes, etc. Coffee, cocoa, pepper, vanilla, and many other articles of commerce, are obtained from fruits.

While some fruits are of the highest value as articles of food, others are generally regarded rather as articles of luxury; yet the abundance of succulent fruits in tropical climates is a bountiful provision for real wants, contributing much to the health of the inhabitants. The coolness of suc-



NAPOLEON ("ROYAL ANN") CHERRY TREE IN A CALIFORNIA ORCHARD.

culent fruits render them peculiarly grateful in the heat of the tropics; their temperature, when newly gathered, being much below that of the surrounding atmosphere.

Cultivated Fruits.—In its popular use, the term fruit sometimes has almost the same signification as in the language of botanical science; sometimes it is employed as almost exclusively designating the edible succulent fruits. Of the edible fruits (all of which cannot here be enumerated) many will be found noticed in other botanical articles; they belong to many and very different natural orders, both of endogenous and exogenous, chiefly exogenous, plants. Following is the list of fruits published by the American Pomological Society in 1899:

FRUITS MAINLY ADAPTED TO NORTHERN LOCALITIES.

APPLES (*Pyrus*).
1. Crabs (*P. prunifolia*). (Includes such possible hybrids as strongly manifest Crab parentage.)
2. Apples (*P. malus*).

APRICOTS (*Armeniaca vulgaris*).

BLACKBERRIES AND DEWBERRIES (*Rubus*).
1. Blackberries (*R. villosus*).
2. Dewberries (*R. canadensis*).

CHERRIES (*Cerasus*).
1. Hearts and Bigarreaus (*C. avium*).
2. Duke and Morello Cherrics (*C. vulgaris*).

CURRANTS (*Ribes*).
1. *R. nigrum* and *aureum.*
2. *R. rubrum.*

GOOSEBERRIES (*Ribes*).
1. *R. grossularia* (includes American seedlings of this parentage).
2. *R. oxyacanthoides* (Includes apparent hybrids of this with other species).

GRAPES (*Vitis*).
1. *V. aestivalis* (includes apparent hybrids).
2. *V. labrusca* (includes apparent hybrids).
3. *V. lincecumii* (includes apparent hybrids).
4. *V. rotundifolia.*
5. *V. vinifera.*
6. *V. vulpina:* syn. *Riparia* (Includes apparent hybrids).

MULBERRIES (*Morus alba* and *rubra*).

NECTARINES AND PEACHES (*Persica vulgaris*).
1. Nectarines (*P. vulgaris* var. *lævis*).
2. Peaches (*P. vulgaris*). (The distinctive peculiarities of the families or strains of peaches known as Chinese, Persian, and Spanish being more or less ill-defined and obscured by crossing or hybridization, a correct classification of varieties under these heads is not deemed practicable.)

PEARS (*Pyrus communis* and *sinensis*).

PLUMS (*Prunus*).
1. *P. americana.*
2. *P. angustifolia.*
3. *P. cerasifera* (includes supposed hybrids).
4. *P. domestica.*
5. *P. hortulana.*
6. *P. triflora.*
7. *P. pumila.*

QUINCES (*Cydonia vulgaris*).

RASPBERRIES (*Rubus*).
1. *R. idæus* (includes possible hybrids).
2. *R. neglectus.*
3. *R. occidentalis.*
4. *R. strigosus.*

STRAWBERRIES (*Fragaria*).

NUTS.
1. Almonds (*Amygdalus communis*).
2. Chestnuts (*Castanea*).
3. Filberts and Hazelnuts (*Corylus avellana*).

4. Pecans (*Hicoria pecan*).
5. Persian, or European Walnuts (*Juglans regia*).

SUBTROPICAL AND TROPICAL FRUITS.

CITROUS FRUITS.

1. Bitter oranges (*Citrus bigardia*).
2. Citrons (*C. medica*).
3. Kumquats. Kinkans (*C. japonica*).
4. Lemons (*C. limonum*).
5. Limes (*C. acida*).
6. Mandarins (*C. nobilis*).
7. Pomeloes. Grape Fruit. Shaddocks (*C decumana*).
8. Sweet Oranges (*C. aurantium*).

FIGS (*Ficus carica*).
GUAVAS (*Psidium*).
KAKIS, Japanese Persimmons (*Diospyros kaki*).
OLIVES (*Olea europea*).
PINEAPPLES (*Ananassa sativa*).
POMEGRANATES (*Punica granatum*).

NATIVE AND INTRODUCED FRUITS AND NUTS GROWN IN THE OPEN AIR.

Botanical Name	*Common Name.*
Achras Sapota, Linn	Sapodilla.
Andansonia digitata, Linn	Baobab, Monkey Bread, Sour Bread.
Aegle marmelos, Correa	Bengal Quince.
Akebia quinata, Decnisne	
Amelanchier alnifolia, Nutt	Western Dwarf Juneberry.
Botryapium, D. C	Dwarf Juneberry.
Canadensis, T. and G	Serviceberry, Shadberry, Juneberry.
Anona cherimolia, Mill	Cherimoya, Cherimolia, Jamaica Apple.
Glabra, Linn	Pond Apple.
Muricata, Linn	Soursop.
Reticulata, Linn	Custard Apple, Bullock's Heart.
Squamosa, Linn	Sugar Apple, Sweetsop.
Antidesma Bunius, Spreng	
Arbutus unedo, Linn	Strawberry Tree.
Artocarpus incisa, Linn	Breadfruit.
Integrifolia, Linn	Jackfruit, Jaca.
Asimina grandiflora, Dunal	Papaw.
Triloba, Dunal	Papaw, Pawpaw.
Atalantia trimera, Oliv	Limeberry.
Averrhoa Bilimbi, Linn	Bilimbi.
Carambola, Linn	Carambola.
Berberis Aquifolium, Pursh	
Trifoliolata, Moric	Aljarita.
Vulgaris, Linn	Barberry, Berberry.
Blighia Sapida, Kon	Akee.
Carica Papaya, Linn	Papaw, Melon Papaw.
Carissa Arduina, Lam	Amatungula.
Carandas, Linn	Caraunda, Christ Thorn.
Casimiroa edulis, Le Clare	White Sapota, Zapote Blanco.
Ceratonia Siliqua, Linn	Carob, Karoub, Algaroba, St. John's Bread.
Cereus triangularis, Mill	Strawberry Pear.
Chrysobalanus Icaco, Linn	Cocoa Plum.
Chrysophyllum Cainito, Linn	Star Apple.
Citrus bergamium, Risso	Bergamot Orange.
Trifoliata, Linn	Trifoliate Orange, Hardy Orange.
Coccoloba uvifera, Linn	Sea Grape, Shore Grape.
Cornus Mas, Linn	Carnelian Cherry.
Cratægus coccinea, Linn	Haw, Thornapple.
Var. mollis, T. and G	Haw.
Cydonia sinensis, Thouin	Chinese Quince.
Cyphomandra betacea, Sendt	Tree Tomato.
Diospyros texana, Scheele	Black Persimmon.
Virginiana, Linn	Persimmon.
Elæagnus multiflora, Thunb	Goumi.
Umbellata, Thunb	
Eriobotrya japonica, Lindl	Loquat, Japanese Medlar.
Erythea edulis, S. Watson	
Eugenia brasiliensis, Lam	Brazil Cherry.
Jambos, Linn	Rose Apple.
Uniflora, Linn	Surinam Cherry.
Feronia elephantum, Corr	Elephant Apple.

FRUIT.

Ficus glomerata, Roxb.....Cluster Fig.
Fragaria californica, Cham. and Sch.....California Strawberry.
Chilœnsis, Duchesne.....Chile Strawberry.
Collina, Ehr.....Green Strawberry, Hill Strawberry.
Elatior, Ehr.....Hautbois Strawberry.
Vesca, Linn.....English Wild Strawberry, Alpine.
Virginiana, Duchesne.....Wild Strawberry.
Virginiana var. illinoesis, Gray....Western Wild Strawberry.
Garcinia mangostana, Linn.....Mangosteen.
Glycosmis citrifolia, Lindl.....
Garuga pinnata, Roxb.....
Hibiscus sabdariffa, Linn.....Jamaica Sorrel, Rosella.
Hovenia dulcis, Thunb.....
Lucuma mammosa, Gaert.....Mammee Sapota.
Rivicoa var. angustifolia, Gaert....Egg Fruit, Tiess, Canistel.
Mammea americana, Linn.....Mammee Apple.
Mangifera indica, Linn.....Mango.
Melicocca bijuga, Linn.....Ginep, Spanish Lime.
Monstera deliciosa, Liebm.....Ceriman.
Morus celtidifolia, H. B. and K.....Mexican Mulberry.
Japonica, Aud.....Japanese Mulberry.
Nigra, Linn.....Black Mulberry.
Musa chinensis Sweet, Syn.....Dwarf Banana, Chinese Banana.
M. Cavendishii, Lambert.....
Corniculata, Lour.....Lubang.
Paradisiaca, Linn.....Plantain.
Sapientum, Linn.....Banana, Horse Banana.
Myrica Nagi Thunb, syn. *M. rubra.*
Sieb. and Zucc.....
Nephelium Lit-chi, Chambess.....Litchi, Lee Chee.
Nuttalia cerasiformis, T. and G.....Oso Berry.
Opuntia Ficus-Indica, Mill.....Indian Fig.
Tuna, Miller.....Prickly Pear.
Vulgaris, Miller.....Prickly Pear.
Passiflora edulis, Sims.....Granadilla.
Incarnata, Linn.....May Apple, May pop.
Laurifolia, Linn.....Water Melon.
Ligularis, Juss.....
Maliformis, Linn.....Sweet Cup, Calabash.
Quadrangularis, Linn.....Granadilla.
Pereskia aculeata, Miller.....Barbados Gooseberry.
Persea gratissima, Gaert.....Aguacate, Avocado, Alligator Pear.
Phœnix dactylifera, Linn.....Date Palm.
Phyllanthus distichus, Muell.....Otaheite Gooseberry.
Emblica, Linn.....Myrobolan.
Physalis Alkekengi, Linn....Strawberry Tomato, Winter Cherry.
Peruviana, Linn.....Cape Gooseberry.
Prunus Besseyi, Bailey.....Western Dwarf Cherry.
Capollin, Zucc.....Capullin, Capullino.
Dasycarpa, Ehr.....Purple Apricot, Black Apricot.
Demissa, Walp.....California Wild Cherry.
Emarginata, Walp.....
Ilicifolia, Walp.....Islay.
Mahaleb, Linn.....Mahaleb Cherry.
Maritima, Wang.....Beach Plum.
Mume. Lieb. and Zucc.....Chinese or Japanese Apricot.
Pennsylvanica, Linn.....Pin Cherry, Bird Cherry.
Padus, Linn.....European Bird Cherry.
Paniculata, Thunb.....Sakura.
Subcordata, Benth.....Wild Plum of California.
Tomentosa, Thunb.....
Virginiana, Linn.....Choke Cherry.
Watsoni, Sargent.....Sand Plum.
Pyrus augustifolia, Ait.....Southern Crabapple.
Coronaria, Linn.....Native Crabapple.
Germanica, J. Hooker.....Medlar.
Iœnsis, Bailey.....Prairie Crab.
Japonica, Thunb.....Japanese Quince.
Rivularis, Dougl.....Oregon Crab.
Salicifolia, Linn.....
Sieboldi, Regel.....
Pyrus Sorbus, Gaert.....Service Tree.
Rhodomyrtus tomentosa, Wight.....Downy Myrtle.

FRUIT.

Ribes Cynosbati, Linn.....
Americanum, Mill.....Native Black Currant.
Rubus cratægifolius, Bunge.....Siberian Raspberry.
Cuncifolius, Pursh.....Sand Blackberry.
Deliciosus, Torr.....
Ellipticus, Smith.....Raspberry.
Invisus, Bailey.....Dewberry.
Microphyllus, Linn, syn., *R. palmatus*, Thunb.....
Nutkanus, Mocino.....Cloudberry.
Phœnicolasius, Maxim.....Japanese Raspberry, Wineberry.
Rosæfolius, Sm., Syn. *R. sorbifolius*....Strawberry Raspberry.
Trivialis, Mich.....Southern Dewberry.
Vitifolius, Cham. and Schlect.....Western Dewberry.
Sambucus canadensis, Linn.....Elderberry.
Shepherdia argentea, Nutt.....Buffalo Berry.
Solanum muricatum, Ait.....Pepino.
Tamarindus Indica, Linn.....Tamarind.
Triphasia Aurantiola, Lour.....Limeberry.
Vaccinium corymbosum, Linn..Swamp Blueberry, Highbush Huckleberry.
Macrocarpon, Ait.....American Cranberry.
Pennsylvanicum, Lam.....Blueberry.
Vangueria madagascarensis, J. F. Gmel.....Voa-vanga.
Viburnum, Opulus, Linn.....Highbush Cranberry.
Vitis arizonica, Engelm.....
Berlandieri, Planch.....
Californica, Benth.....
Candicans, Engelm.....Mustang Grape of Texas.
Cinerea, Engelm.....Sweet Winter Grape.
Cordifolia, Lam.....Winter Grape, Frost Grape.
Champini, Planch.....
Doaniana, Muns.....Doan's Grape.
Monticola, Buck.....Sweet Mountain Grape.
Rupestris, Scheele.....Sand Grape
Ximenia americana, Linn.....“Alvarillo del Campo.”
Zizyphus jujuba, Lamarck.....Jujube.
Sativa, Gaert.....Jujube of Southern Eur.

NUTS.

Aleurites triloda, Forst.....Candlenut.
Anacardium occidentale, Linn.....Cashew Nut.
Castanea nana, Muhl.....Dwarf Chinquapin.
Castanea pumila, Mill.....Chinquapin, Chinkapin, Chincapin.
Calodendrum capensis, Thunb.....Cape Chestnut.
Castanopsis chrysophylla, A. DeC.....Western Chinkapin.
Castanospermum australe, Cunn.....Moreton Bay Chestnut.
Coos nucifera, Linn.....Cocoanut.
Cola acuminata, Schott and Endlich.....Cola, Bissy, Goora.
Corylus americana, Walt.....American Hazel.
Californica, Rose.....California Hazel.
Rostrata, Ait.....Beaked Hazel.
Gevuina avellana, Molina.....Chilean Nut.
Ginkgo biloba, Linn.....Ginkgo, Maidenhair Tree, Pa-koo.
Hicoria glabra, Britt.....Pignut.
Lacinosa, Sarg.....Shellbark, Big Shellbark.
Ovata, Britt.....Shagbark, Little Shellbark.
Jubæa spectabilis, Humb.....Coquito, Small Cocoanut.
Juglans californica, Wats.....California Black Walnut.
Cinerea, Linn.....Butternut, White Walnut, Oilnut.
Cordiformis, Maxim.....Japancse Walnut.
Mandshurica, Maxim.....Japanese Walnut.
Nigra, Linn.....Black Walnut.
Rupestris.....Mexican Walnut.
Sieboldiana, Maxim.....Japanese Walnut.
Macadamia ternifolia, F. V. Muell.....Queensland Nut.
Pistacia Terebinthus, Linn.....Turpentine Tree.
Vera, Linn.....Pistachio.
Sapium sebiferum, Roxb.....Tallow Nut.
Terminalia Catappa, Linn.....Tropical Almond.
Torreya nucifera, Lieb. and Zucc.....

FRUIT GARDEN.—Distinct from the orchard (q. v.), in that it is confined to a more limited area and is devoted in

part to the production of the smaller fruits and often also to garden vegetables. From the earliest historic period the garden has been one of the chief sources of pleasure in country life, and in it fruits have always occupied a prominent place. In villages and country towns the fruit garden has also been retained, and it is one of the last features of country life to disappear when the cottage gives place to the city mansion.

Without exception the leading nations of antiquity paid considerable attention to the fruit garden. The Assyrians, Babylonians, and Egyptians were noted for their cultivation of various garden fruits. As evidence of the remarkable prosperity of the Jews during the reign of Solomon it is said that they 'dwelt safely, every man under his vine and under his fig tree.' The Chinese, at a very early period, were eminently successful in their efforts to grow fruit in gardens, and have long been noted for their skill in dwarfing trees. The Greeks and Romans took a great deal of interest in the fruit garden. One of the benefits resulting to Britain and other countries from Roman conquest and occupation was the introduction of superior varieties of fruits and better methods of cultivation. During the middle ages careful attention was paid to fruit growing by the monks in the spacious and, for the times, well-appointed gardens attached to the monasteries in which their secluded lives were passed.

The first fruit of the cultivation of which we have specific information is the grape, but there is little doubt that the fig, olive, and pomegranate were grown at about the same period, and that melons of various kinds were produced in abundance. It is also probable that most of the leading fruits of the present day were known to people of the ancient world, though the number of varieties was small and their quality was greatly inferior to that of the improved sorts of the present day. It is certain that among ancient Romans the grape, fig, and olive were commonly and extensively cultivated, and that in the gardens of the rich almost every fruit now grown found a place.

The fruit garden should be located near the dwelling, in order that it may be conveniently reached and because it will be less likely to suffer from neglect than it will if far from the house. A sheltered position is very desirable but if not available, wind-breaks of evergreens may be planted at a little distance from the outer edge of the garden. This is of special importance where the more tender varieties of fruit are to be grown. If not naturally dry the land should be deeply and thoroughly underdrained. The ground must be finely pulverized and the trees carefully put out: see ORCHARD. Trees may be grown as standards, by far the most common method in this country; as dwarfs, or trained against a wall or trellis: see ESPALIER. Under the former system they require more room and a longer period in which to come into bearing than by either of the latter methods, but a much larger quantity of fruit is pro-

duced. The trees are also longer lived and they require less attention than those artificially trained. If the garden is small the varieties of fruit to be grown should be selected with reference to this fact, as trees of some sorts require nearly twice as much room as those of others. In the case of the pear, dwarfed trees (see ORCHARD) are often set in the garden instead of standards. A few choice varieties seem to produce even better fruit when dwarfed than they do when grown in the ordinary manner. The apple may be readily grown either as a dwarf tree on paradise stock or as a half-standard on doucin stock or its equivalent in especially vigorous strains of paradise. With a proper selection of varieties trees may be thus secured which will be highly productive and yield an excellent grade of fruit. It has been generally believed that in America dwarf apple trees are fit only for garden culture because standard trees are capable of producing a greater yield per acre, but with the continued introduction of injurious insects and fungi and the consequent necessity of spraying every twig thoroughly, and with the increasing demand in market for absolutely perfect and well-grown fruit, there is a tendency to try the planting of apples on doucin stock in commercial orchards because of the ease with which the trees may be sprayed and the fruit thinned and gathered.

Paradise and doucin stocks are more shallow rooted than are standard apples and require more attention in the matter of providing a well drained soil and one filled with humus to give it high moisture-holding capacity. It is well also where winters are rigorous to protect the roots by mulching during winter. In the northern portion of the apple belt, where paradise and doucin stocks are not fully hardy, apples may be dwarfed by working them on stocks of certain forms of baccata. Unless the fruit garden is to be maintained more for beauty than for its utility the trees should be set in regular rows and disposed in such a manner as to interfere as little as possible with the cultivation which the growing crops, as well as the trees, require. Even then care will be needed to prevent injury to the trunks and the large roots when the land is plowed and the other tillage operations are performed.

Small trees should always be obtained for the fruit garden. They are more likely to live than large ones, grow more rapidly, and are in every way more satisfactory. It is well to obtain them from some reliable nursery (see NURSERY) in the vicinity. Varieties should be selected not only with reference to their size and habits of growth, but also with respect to their adaptation to the climate and soil in which they are to be grown. In localities where winters are severe and especially in wind-swept prairie regions it is best to set them in the spring. In some localities, fall is usually the most favorable. The work must be carefully done, and for some years the trees will need considerable attention. For details of transplanting and subsequent management, see ORCHARD.

FRUIT.

Besides the fruits which may be profitably produced either in the garden or the orchard, are several classes which are not suited to the latter location, but which should be abundantly grown in every fruit garden. Prominent among these are the grape, currant, gooseberry, raspberry, and strawberry. Within the past quarter of a century the production of these fruits has been wonderfully increased, and has assumed a great commercial importance. A large number of new varieties have been originated, some of which, both in quality and productiveness, are very great improvements. The land for these fruits should be prepared as carefully as for the trees already noted. The rows should be straight and far enough apart to easily admit of cultivation. In this way more and better fruit will be produced than can be obtained if the plants are so crowded as to interfere with thorough tillage. Neither weeds nor grass should be allowed to grow in any portion of the fruit garden. They take the elements of plant food from the soil, injure the fruit in quality and diminish it in quantity, and furnish shelter for many and destructive insect foes. The tillage required to keep the ground free from foul plants will rapidly promote the growth of the crops and would amply be repaid thereby even if the appearance of weeds did not make it imperative.

COMMERCIAL FRUIT GROWING.—The census of 1900 reports on the farms of the United States as classified according to the principal source of income from the farm. Where the income from any particular source equaled or exceeded 40 per cent. of the total income, that source determined the classification of the farm. Thus, in case 40 per cent. of the income was received from fruit, it was called a fruit farm. The horticultural farms were listed under the four sources of income—vegetables, fruits, flowers and plants, nursery products. These farms had a total acreage of 16,514,705 acres, valued at $1,058,464,079, an average per acre of $64.10, as shown in the following table:

FARMS CLASSIFIED ACCORDING TO PRINCIPAL SOURCES OF INCOME.

CLASS.	Acres.	Value of all farm property.	Average value per acre.
All farms	841,201,546	$20,514,001,838	$24 39
Vegetables	10,156,679	$546,921,965	$53 85
Fruits	6,149,584	439,933,714	71 54
Flowers and plants	42,662	52,462,419	1,229 72
Nursery products	165,780	19,145,981	115 49
Total for horticulture	16,514,705	$1,058,464,079	$64 10

The acreage for all farms is fifty-one times as great as the acreage of horticultural farms, while the value of all farm property is only nineteen times as great as the value of horticultural farm property. The average value of

fruit farms per acre is about one-third more than the value per acre of vegetable farms and three times the value per acre of all farms.

Secretary Wilson, in his report of the Department of Agriculture for 1905, states that the department has just completed an investigation of the changes in the values per acre of medium farms since the census of 1900. Farms are classified in this report according to their principal sources of income, conforming substantially to the census classification for 1900. Fruit farms show an increase in value of 27.9 per cent. and vegetable farms 26.7 per cent. The highest increases in dollars per acre are, for vegetable farms, $11.10; sugar farms, $12.34; and fruit farms, $15.71.

Value of Fruit Crop, 1900.—The reported values of fruit crops in the census of 1900 are, approximately, as follows: Orchard fruits, $83,750,000; grapes, $14,091,000; small fruits, $25,000,000; subtropical fruits, $8,550,000; nuts, $1,950,000; miscellaneous, $2,678; total, $133,373,678.

The number of orchard trees reported by the census enumerators increased from about 193,500,000 in 1890 to 367,200,000 in 1900. The increase in the number of apple trees alone during the same decade was more than 80,000,000.

Commercial Orcharding.—In colonial times the commercial orchards were of comparatively little importance. In this country the beginning of the foreign trade in fruits probably dates back as early as the beginning of the eighteenth century, but there are no records of shipment until 1741, when it is stated that apples were exported from New England to the West Indies in considerable abundance. The first record which we have of the shipment of apples across the Atlantic was that of Newtown Pippins, of the crop of 1758, sent to Benjamin Franklin, in London. Statistics on the subject are lacking until 1821, when the total export of fruit contained in the treasury statement consisted of 68,443 bushels of apples, valued at $39,966. As transportation facilities gradually improved by the opening of canals and railways, farmers in numerous interior localities found that they could send their fruit to other than local markets and receive profitable returns. Accordingly commercial orcharding began to attract attention, especially in those regions which were found to be naturally favorable to the production of good fruit. A notable increase in the planting of commercial orchards occurred in the decade from 1850 to 1860 in certain portions of the Eastern states. Later, commercial orcharding in the Middle West began to assume considerable importance, and it has continued to increase up to the present time. Apple orchards which were planted in regions where that fruit had not been hitherto grown were at first comparatively free from injurious insects and fungous diseases, but gradually these troubles became relatively more and more important, until at times they

threatened the stability of the industry. In fact, in some of the best apple-growing regions of the country, orchardists became so discouraged at the outlook that in the decade from 1880 to 1890 they began to cut down their commercial orchards. After spraying as a means for combating insects and diseases was introduced in orchard practice, and it became demonstrated that by this means some of the most destructive enemies of the apple might be profitably kept under control, the business of growing apples was put upon a more stable basis than ever before.

Notable improvements in the methods of orchard management in matters of tillage and cover crops then came into vogue among the most progressive orchardists. Facilities for holding apples, both in common and cold storage, were also greatly increased. The export trade developed more extensively, giving steadier markets for the better grades of fresh fruits, and also the business of evaporating apples assumed considerable importance. Statistics show that the apples in storage about December 1 of each year increased from approximately 800,000 barrels in 1898 to nearly 3,000,000 barrels in 1902. The annual export of apples in 1893 was 408,000 barrels, valued at $1,098,000, while that of 1903 was 1,656,000 barrels, valued at $4,382,000. The export of dried apples in 1893 was 7,967,000 pounds, valued at $482,000, while that of 1903 was 39,646,000 pounds, valued at $2,379,000.

The remarkable development of the industry of fruit and vegetable growing in this country which has been seen during the last quarter-century has been accompanied by a corresponding development of allied industries, particularly those concerned with the storing of fruits and vegetables, both with and without artificial refrigeration, the evaporation of fruits, the canning of fruits and vegetables, the manufacture of pickles, jellies, preserves, etc., and the transportation and marketing of the products of all of these industries.

The Canning Industry.—The canning industry is an evolution of the last 40 years. About 1840, experiments in corn canning began near Portland, Me., but years passed before the business began to be established even on a small scale. California made a pack of hermetically sealed fruits in tin cans in 1861. The Maryland pack of all kinds of canned goods was not more than 8,000 cases in 1865. In 1899 Maryland packed 2,793,522 cases of tomatoes alone.

Thirty years ago canned goods were a luxury, relatively expensive, and used only in emergencies on shipboard or at remote places where other food was unobtainable. Today their use is universal among the poor as well as the rich. The value of vegetables and fruits put up in cans in 1880 was approximately $17,600,000; in 1890, $29,860,000; and in 1900, $56,670,000. The value of pickles, preserves and sauces made in factories increased from approximately $2,400,000 in 1880 to $21,500,000 in 1900.

FRUITION, n. *frô-ĭsh′ŭn* [OF. *fruition*; L. *frŭŏr*, I enjoy (see FRUIT)]: the pleasure derived from use or possession; enjoyment.

FRUIT-PIGEON (*Carpophaga*): genus of *Columbidæ* (q.v). having the bill considerably depressed at the base, compressed and moderately arched at the tip, the membrane in which the nostrils are pierced little prominent or swollen, the forehead low, and the feathers advancing on the soft part of the bill, the wings moderately long, the feet, particularly the hinder claw, large, and formed for grasping. During the breeding-season, a curious gristly knob grows on the base of the upper mandible of some of the species, and soon afterward disappears. They are birds of splendid plumage, natives of the forests of India, the Indian Archipelago, the warmer parts of Australia, and the islands of the Pacific Ocean. Their food consists of fruits.

FRUITS, in Law: fruits of the soil, in their legal aspect. These fall under various legal categories, and follow different destinations according to their nature, and the situation in which they are placed. If not separated from the soil, they are considered as part of it, and pass with the same upon a change in its ownership. In favor of tenants however, holding under tenancies of uncertain duration, there is an exception which gives them what are termed 'Emblements' that is, a right to gather the crops which they have planted (see EMBLEMENTS). In favor of nurserymen the right exists to remove fruit trees of their own planting from leased premises. See FIXTURES. Fruits which have become separated from the soil are personal property. In respect to the ownership of fruit on growing trees it may be said 'that trees standing wholly within the boundary line of one's land, belong to him, although their roots and branches may extend into an adjacent owner's land. And such is the case in respect to the ownership of the fruit of such trees, though grown upon the branches which extend beyond the line of the owner's land. And it would be a trespass for the owner of the land over which the branches extend to prevent the owner of the tree, by personal violence, from reaching over and picking the fruit growing upon those branches, while standing upon the fence dividing the parcels. But the adjacent owner may lop off the branches, or roots, of such trees up to the line of his land. If the tree stand so nearly upon the dividing line between the lands that portions of its body extend into each, the same is the property in common of the land owners.' (1 Washburn R. P. 13.) The malicious injury or destruction of fruit trees is a criminal offense. See ORCHARD; PLANTATION.

FRUMENTACEOUS, a. *frô′mĕn-tā′shŭs* [L. *frumentum*, corn or grain: It. *frumento:* F. *froment*]: made of or resembling wheat or grain. FRU′MENTA′TION, n. *-shŭn*, a largess of grain among the anc. Romans. FRU′MENTY, n. *-tĭ* [F. *frumentée*—from OF. *froument*, wheat]: a kind of wheat-gruel.

FRUMENTIUS, *frū-mĕn'shē-ŭs*, SAINT: apostle of Ethiopia and the Abyssinians: b. in Phœnicia toward the beginning of the 4th c.; d. abt. 360. At a very early age, he and another youth, named Œdesius, accompanied their uncle Meropius, Greek philosopher from Tyre, on a voyage for mercantile, or according to others, for scientific purposes. On their return, they landed on the coast of Abyssinia or Ethiopia, to procure fresh water; but the savage inhabitants, under the pretext of their hostility to the Romans, made an onslaught upon them, and murdered Meropius and the whole crew, sparing only the two boys, whom they found sitting under a tree and reading. They were taken as slaves into the service of the king, and made themselves so beloved that Œdesius was soon raised to the office of cupbearer, while the more sagacious Frumentius became the king's private sec. and accountant. After the death of the monarch, Frumentius was appointed instructor to the young Prince Aizanes, and in this capacity he obtained a still greater influence on the administration of the state affairs. He aided the Christian merchants who sought these parts, in founding a church, and gradually paved the way for the formal introduction of Christianity. In 326, he went to Alexandria—Œdesius having returned to Tyre, where he was made presbyter—and convinced Athanasius, who had recently been nominated bp. of Alexandria, of the necessity of appointing a special ecclesiastical dignitary for Abyssinia, who should carry out vigorously the work of conversion. Athanasius, in full synod, and with its unanimous approbation, consecrated Frumentius himself bp. of Axum (Auxuma). The new bishop repaired to Abyssinia, and succeeded in proselytizing large numbers. He is also supposed to have translated the Bible into Ethiopian: see ETHIOPIA. Afterward he had theological disputations with Theophilus the Arian—Frumentius himself being in all probability an Athanasian. His day is celebrated by the Latins Oct. 27; by the Greeks Nov. 30; and by the Abyssinians Dec. 18. Socrates, i. 15; Rufin, *Hist. Eccl.* i. 9; Theodoret, i. 22; Ludolf, *Hist. Æth.* iii, 7, 17, etc.

FRUMP, v. *frŭmp* [an imitative word: It. *frombare*, to whizz: Bav. *rimpfen*, to shrink, to wrinkle]: in *OE.*, to jeer or mock; to flout: N. in *OE.*, a flout; a jeer; an ill-tempered person; a cross old woman; a grotesque old woman.

FRUSH, a. *frŭsh* [F. *froisser*, to bruise—from mid. L. *frictĭārĕ*—from L. *frictus*, rubbed: It. *frusciare*, to crush together: an imitative word]: in *Scot.* and *prov. Eng.*, easily broken or crushed; dry; crumbling: V. to bruise; to dash violently to pieces. FRUSH'ING, imp. FRUSHED, pp. *frŭsht*.

FRUSH, n. *frŭsh* [F. *fourche*, a fork—from L. *furca*, a fork]: a forked ligament growing in the middle of the sole of a horse's hoof: another name for FROG 2, which see.

FRUSTRATE, v. *frŭs'trāt* [L. *frustrātŭs*, disappointed, deceived—from *frustra*, without effect, in vain: It. *frus-*

trare: F. *frustrer*]: to defeat; to disappoint; to bring to nothing; to render of no effect: ADJ. in *OE.*, of no effect; vain; useless; disappointed. FRUS'TRATING, imp. FRUS'TRATED, pp. FRUSTRA'TION, n. *-trā'shŭn* [F.]: the act of frustrating; disappointment; defeat.—SYN. of 'frustrate, v.'; to baffle; disconcert; discomfit; foil; confound; balk; nullify.

FRUSTUM, n. *frŭs'tŭm* [L. *frustum*, a fragment, a broken piece. It. *frusto*, a little piece. F. *fruste*, defaced]: in *geometry*, the part of a solid next the base, left on cutting off the top by a plane parallel to the base, as a truncated cone. Formulæ for the volume and surface of the simpler types of frustums are given in the textbooks on Geometry. Where the lateral faces are plane the volume is given by the *prismatoid formula:* $V = \frac{1}{6}h\,(b+b'+4m)$, b and b' being the areas of the two bases and m the area of a section parallel to the bases and midway between them. The frustum of a sphere or spheroid is the segment comprised between two parallel circular sections; and the *middle* frustum of a sphere is that whose faces are equal circles, having the centre of the sphere in the middle of it and equally distant from both faces. FRUSTULES, n. plu. *frŭs'tūlz*, in *bot.*, the parts or fragments into which diatoms separate. FRUS'TULOSE, a. *-tū-lōs*, consisting of fragments.

FRUTESCENT, a. *frô-tĕs'ĕnt* [L. *frŭtĭces'cens* or *frŭtĭcescen'tem*, putting forth shoots—from *frŭtĕx* or *frutĭcem*, a shrub: It. *frutice*]: growing or becoming shrubby; taking the character of a shrub. FRUTES'CENCE, n. *-ĕns*, state of becoming shrubby. FRUTICANT, a. *frôt'ĭk-ant*, full of shoots. FRUTICOSE, a. *frô'tĭ-kōs*, or FRU'TICOUS, *-kŭs* [L. *frutĭcōsus*]: shrubby.

FRY, v. *frī* [F. *frire*, to fry, to parch—from L. *frīgĕrĕ*, to roast, to parch]: to heat or roast in a pan over a fire; to cook in a pan; to endure or suffer the action of extreme heat: N. a dish of anything fried. FRY'ING, imp.: N. the process or act of roasting in a pan over the fire (see FOOD AND DRINK). FRIED, pp. *frīd*, cooked by frying. FRYING-PAN, a shallow pan with a long handle for preparing food by frying. OUT OF THE FRYING-PAN INTO THE FIRE, from bad to worse.

FRY, n. *frī* [F. *frai;* OF. *fray*, spawn of fish or frogs: Goth. *fraiv*, seed: Icel. *friof* or *frió*, seed]: the young brood of fish lately spawned; a swarm of little animals; *familiarly*, a number of very young children.

FRY, *frī*, ELIZABETH: eminent philanthropist and preacher of the Society of Friends: 1780, May 20—1845, Oct. 12; third daughter of John Gurney, of Earlham Hall, near Norwich, England. Her active and untiring exertions for the help of suffering humanity acquired for her in her lifetime the name of 'the female Howard.' When not more than 18 years of age, she established a school for 80 poor children in her father's house, with his entire sanction. In 1800, at the age of 20, she married Joseph Fry,

of Upton, Essex, then engaged in business in London. She had eight children. In the year 1813, the deplorable condition of the female prisoners in Newgate attracted her attention, and she resolved upon visiting them. Alone and unprotected, she entered the part of the prison where 160 of the most disorderly were immured, and addressed them with a dignity, power, and gentleness which at once fixed their attention. She then read and expounded a portion of Scripture, many of those unhappy beings hearing then the word of grace for the first time. It was not, however, till about Christmas 1816 that she began her systematic visits to Newgate, being particularly induced thereto by the reports of the gentlemen who, 1815, originated the 'Society for the Improvement of Prison Discipline.' She instituted a school within the prison walls, provided work for the women and the means of Christian instruction, and established a committee of ladies for the reformation of women prisoners. The almost immediate result was order, sobriety, and neatness, in place of the riot, licentiousness, idleness, and filth, which had previously prevailed. In 1818, her exertions were directed to making provision for the benefit of women convicts sentenced to transportation. For the relief of women in foreign prisons, she made frequent journeys on the continent of Europe. She interested herself also in the abolition of slavery, the advancement of education, and the distribution of Bibles and tracts. Her labors for the improvement of British seamen, by furnishing the ships of the coast guard and the royal navy with libraries of religious and instructive books, received the sanction and assistance of government. To the poor and helpless, her charities were unbounded. As a preacher among her own sect, she was held in high estimation; and she often engaged in gospel missions, not only throughout England, Scotland, and Ireland, but to various countries on the continent. She died at Ramsgate, aged sixty-five. Soon after her death, a public meeting was held in London, the lord mayor in the chair, for establishing, as the best monument to her memory, 'The Elizabeth Fry Refuge,' for affording temporary food and shelter to destitute women, on their discharge from metropolitan prisons. See the *Life of Elizabeth Fry*, 2 vols. (1847), published by her daughters, and the short life by Mrs. Pitman (1884).

FRY, James Barnet: 1827, Feb. 22—1894, July 11; b. Carrollton, Ill. He graduated at the U. S. Milit. Acad. 1847, was asst. instructor of artill. at the Acad. a short time, served with the 3rd U. S. artill. in Mexico 1847–8, was reappointed instructor at the Acad. 1853, and was adj. there 1854–59. In 1861, Mar., he was commissioned asst. adj.gen., served on the staffs of Gens. McDowell 1861 and Buell 1862, was appointed provost-marshal-gen. of the U. S. 1863, Mar. 17, and held the office till its abolition 1866, Aug. 30. He was brevetted maj.gen. U.S.A. for distinguished services, 1865, Mar. 13, was adj.-gen. of the Div. of the Pacific 1866–69, of the South 1869–71, of the Mo. 1871–73, and of the Atlantic 1873–1881,

June 1, when he was retired. Beside official reports, which show that he placed 1,120,621 men in the army, arrested 76,562 deserters, and collected $26,366,316 during the civil war, he published *Sketch of the Adjutant General's Department, U. S. Army, from* 1775 *to* 1875 (1875); *History and Legal Effects of Brevets in the Armies of Great Britain and the United States, from their Origin, in* 1692, *to the Present Time* (1877); *Army Sacrifices* (1879); *McDowell and Tyler in the Campaign of Bull Run* (1884); *Operations of the Army under Buell* (1884); and *New York and Conscription* (1885).

FRY, William Henry: 1815, Aug. 10—1864, Dec. 21; b. Philadelphia: musical composer. He received a public-school and collegiate education, studied music, composed four orchestral overtures 1835, which were performed by the Philadelphia Philharmonic Soc.; and won its honorary medal, and became an editor on his father's newspaper, the Philadelphia *Gazette*, 1839. In 1845 he produced *Leonora*, an English opera, which met with popular favor and the hostility of musical critics in Philadelphia and New York. The following year he went to Europe as correspondent for the New York *Tribune* and other newspapers, and to study music, and on his return 1852 was appointed musical editor of the *Tribune* and held the office till death. His *Leonora*, reconstructed for the Italian opera company, was produced in New York 1858, and failed to excite even passing interest, and his *Notre Dame*, brought out in the same city 1864, was also unsuccessful. His other compositions include the music for the opening ode for the industrial exhibition in New York 1853; the symphonies, *The Breaking Heart* and *A Day and a Country;* a *Stabat Mater;* and *Eleven Violin Quartets.*

FRYE, James: 1709–1776, Jan. 8; b. Andover, Mass.: soldier. In early life he held a number of local and state offices and became an active militiaman; 1745 took part in the siege and capture of Louisburg; at the opening of the revolutionary war was commissioned col. of the regt. of Essex (Mass.) vols., participated with them in the battle of Bunker Hill, and commanded the 6th brigade of the army that invested Boston, 1775–6.

FRYE, William Pierce, ll.d.: lawyer: b. Lewiston, Me., 1830, Sept. 2. He graduated at Bowdoin College 1850, studied law with William P. Fessenden, practiced some time in Rockland, Me., then settled permanently at his birth-place. He entered political life as a republican member of the legislature, serving 1861, 62, 67; was mayor 1866–7; attor. gen. of Me. 1867–70; member of congress from the 2d Cong. dist. 1871–81, and was elected U. S. senator 1881. Presidential elector in 1864, from 1872 he was a member of the Repub. Nat. Com. In 1880, he was chosen a trustee of Bowdoin College, and 1881 received the degree ll.d. from Bates College. He was re-elected U. S. senator 1883, 1888, 1895, 1901, 1907; pres. pro tem. of the senate 1896 and 1901; member American-Spanish peace commission 1898.

FRYKEN, *frü'kėn:* cluster of small lakes in Sweden, n. of Carlstad, 12 m. n.w. of Lake Wener, into which they discharge by the Nars river. They stretch from n. to s. about 40 m., are surrounded by beautiful scenery, have the town of Frykoende at the n. extremity and Frykstaden at the s.

FRYXELL, *früks'ĕl,* Anders: 1795–1881, Mar. 21; b. Hesselskog, in Dalsland. He studied at Upsala; took priest's orders 1820; and 1828, became rector of St. Mary's School, Stockholm. He afterward became Provost of N. Vermland, but resigned 1847. Fryxell gained reputation first by his *Berättelser ur Svenska Historien* (Narratives from Swedish History, vols. I.—XVIII., Stockh. 1832–52). These narratives, strung together on something of the same plan as Sir Walter Scott's *Tales of a Grandfather,* are marked not only by patriotic sentiment but by fresh and natural conception, richness of biographic detail, naïve and vivacious execution; they soon obtained a wide popularity in Sweden. The first volumes of this truly national work have been repeatedly published, and have been translated into almost all European languages; for example, into English by Schoultz (1844), into German by Homberg (1843). The part devoted to Gustavus Adolphus has also been translated into German by Homberg (1842–3), into French by Mlle. N. du Puget (1839), and into Dutch by Radijs (Utrecht 1844); and that relative to the history of Gustavus Vasa into German by Ekendahl (1831). Fryxell's *Characteristics of the Period from* 1592 *to* 1600 *in Sweden* obtained a prize offered by the Swedish Academy. Another work, *Om Aristokrat-fördömandet i Svenska Historien* (4 vols. Upsala 1845–50), in which he endeavors to clear the Swedish aristocracy from the accusations urged by Geijer and others, involved him in a keen controversy with the democratic liberal party in Sweden. Fryxell addicted himself to poetry and music also; and his opera *Vermland's Flickan* (or 'The Lass of Vermland'), has proved very attractive to his countrymen. He died at Stockholm.

FUACAM ET FLAGELLUM (Gallows and Whip): the lowest of the servile tenures in feudalism, wherein the bondman was both in limb and life utterly at the mercy of his lord.

FUAD-MEHMED, *fô'âd-měh'měd,* Pasha: Turkish statesman and littérateur: 1814–69: b. Constantinople; son of the celebrated poet, Izzet-Effendi-Kitchegizadé, better known under the name Izzet-Mollah; and nephew of Leila Khatum, one of the very few Turkish poetesses. Having received an education more literary than that of the majority of young men destined for public affairs in Turkey, he began to make himself known as an author, when the exile of his father, who had fallen into disgrace with the Sultan Mahmud, and the confiscation of the paternal property, compelled him to chose a profession. He betook himself to medicine, and studied at Galata-Sérai 1828–32; in 1834

was appointed admiralty physician, and accompanied the grand admiral in his expedition against Tripoli; but on his return to Constantinople, he abruptly forsook medicine, and entered the arena of politics. For several years, he employed himself in the study of diplomacy, history, modern languages, the rights of nations, and political economy. In 1840, he became first sec. to the Turkish embassy at London, where his skill and sagacity first made themselves conspicuous. In 1843 he was named second dragoman of the sublime porte, and shortly afterward was chosen to proceed to Spain to felicitate the queen of that country on her accession to the throne. Fuad-Mehmed was very popular at the court of Madrid. It was almost impossible to believe him to be a Turk. He spoke French marvellously well, made *bon mots* like Talleyrand, and showed himself as gallant as an Abencerrage. Curiously enough, though a *Mohammedan*, he obtained, while in Spain, among other honors, the grand cord of Isabella the *Catholic*. Here also he composed a poem on the Alhambra, which Turkish critics praise highly. On his return to Constantinople, he was appointed grand interpreter to the Porte, which brought him into contact with the Duke of Montpensier, who arrived at Constantinople 1845, and who, on his return to France, invested him with the cross of commander of the Legion of Honor. In 1850 he went on a mission to St. Petersburg, and 1853 on another to Egypt. On his return from the first of these, he became minister of foreign affairs under the grand viziership of Aali Pasha (1852, Aug.). On the question of the 'Holy Places,' Fuad-Mehmed, by his attitude, and by a brochure very hostile to the pretensions of Russia, entitled *La Vérité sur la Question des Lieux Saints*, gave great dissatisfaction to the czar. In 1854, Fuad-Mehmed went to Epirus with Omar Pasha, acting sometimes as diplomatist, sometimes as general. In the following year he received the title Pasha, and was again appointed minister of foreign affairs. 1861–66 he held the office of Grand Vizier. To him especially it is said Turkey owes the hatti-sherif of 1856, ordering the consolidation of the external defenses of the Porte and the institution of telegraphs and light-houses.

When the Turkish Acad. of Science and Belles-Lettres was established, 1851, Fuad-Mehmed was one of the first members, and in the following year he published a *Turkish Grammar*, highly esteemed by native scholars. He was loaded with distinctions by European sovereigns.

FUCA, *fū'kâ*, Strait of: water passage separating Washington Territory from Vancouver's Island, and connecting the Pacific Ocean with the Gulf of Georgia. It has its outer or w. entrance in lat. 48° 10′ n., and long. 124° w. It contains several islands, one of which, San Juan, became, 1859, the subject of a dispute between Great Britain and the United States; the question being, whether it was to be regarded as an appendage of Washington Territory or of British Columbia. The question

was submitted, 1872, to the Emperor of Germany as arbiter; and he decided that the line of boundary should be run through the Strait of Haro, w. of San Juan, thus awarding that island to the United States.

FUCACEÆ, *fū-kā′sē-ē:* according to Lindley, a nat. ord. of Acotyledonous plants; but generally regarded by botanists as a sub-order of *Algæ*. The species are numerous, about 500 being known, mostly in salt water. They are distinguished from the other algæ by their organs of reproduction, which consist of spores and antheridia, contained in common chambers or conceptacles, which are united in club-shaped receptacles at the end or margins of the fronds. The antheridia contain phytozoa. The frond is sometimes a stalk expanding into a broad blade, and sometimes exhibits no such expansion, and is either simple or variously branched. Many of the Fucaceæ are provided with vesicles containing air, by the aid of which they float in the water. Some attain great size—*Macrocystis pyrifera* is said to have fronds 500 to 1,500 ft. in length; its stem not thicker than the finger, and the upper branches as slender as pack-thread. Most of the Fucaceæ contain iodine in considerable quantity, and some are therefore much used for the manufacture of KELP (q.v.), particularly different species of *Fucus*, or Wrack (q.v.), and *Laminaria*, or Tangle. On account of the soda which they contain, they are valuable also as a manure. Some are eatable, containing large quantities of gelatinous matter, as the DULSE (q.v.), TANGLE (q.v.), and BADDERLOCKS (q.v.) of the British coasts, and certain species of *Sargassum* in other parts of the world. The medicinal uses of some seem to depend on the iodine which they contain, and which it is now considered preferable to exhibit in other forms, after it has been extracted.

FU-CHOW-FOO, *fô-chow-fô′* (Happy City): city and port of China, cap. of the province of Fuh-Keen. It is beautifully situated on the left bank of the Min., 25 m. from its mouth; lat. 26° 3′ n., long. about 119° 50′ e., and was opened to foreign commerce by the treaty of 1842. The walls of the city are about 30 ft. in height, and 6 m. in circumference, and have seven gates, the gateways of which are of bricks resting on a foundation of granite. The bridge of 40 or 50 arches over the Min. is 12 ft. wide, and about 1,200 ft. long. A Buddhist monastery on Wu-shi-shan has been converted into the city residence of the British consul. The lacquered ware of Fu-chow-foo is of special excellence, and the method of preparing it is known to only one family, by whom the secret is jealously kept. The exports during a flourishing year included 97,455,733 lbs. of tea valued at $21,825,000, but since 1880 trade has greatly declined; the net annual value now is less than $11,500,000. Two-thirds of the vessels which enter and clear are British. The chief imports are lead, cotton, woolen goods, and opium. The duties on foreign trade are greater in amount than those received at any other port in China, except Shanghai. Pop. 624,000.

FUCHS, *fûhs*, JOHANN NEPOMUK VON: 1774, May 15—1856, Mar. 5; b. Mattenzell, Germany: chemist. He was educated in Freiburg, Berlin, and Paris, became prof. of chemistry and mineralogy in the Univ. of Landshut 1807, conservator of the mineralogical collections at Munich 1823, and subsequently prof. of mineralogy and occupant of several offices in the scientific depts. there; retired from official life 1852, and was ennobled 1854. In 1823 he discovered a process for making soluble glass and applying it to the fixing of fresco colors, and the latter method has since been known as stereochromy. See GLASS, SOLUBLE.

FUCHSIA, n. *fū'shĭ-ă* [named after the discoverer, Leonhard von Fuchs, M.D. (1501–66), prof. in the Univ. of Tübingen]: genus of *Onagraceæ* (calycifloral exogens), containing many species, natives of S. America, and of s. parts of N. America. They are half-shrubby plants, shrubs, sometimes climbers, and small trees, and have generally pendulous red flowers; of which the calyx is funnel-shaped, 4-cleft, finely colored; the corolla 4-petalled; the fruit is a 4-celled berry; the leaves are opposite; the flower-stalks 1-flowered, springing from the axils of the leaves, or sometimes forming racemes at the top of the branches. Some of the species, as *Fuchsia coccinea*, *Fuchsia gracilis*, *Fuchsia globosa*, *Fuchsia fulgens*, *Fuchsia macrostemon*, *Fuchsia longiflora*, are much cultivated in gardens and greenhouses. All are propagated with extreme facility by cuttings, which has no doubt contributed to their present abundance, even in the gardens or windows of the poor. New varieties and hybrids have been produced in vast numbers, of which those with white flowers particularly are prized. The berries of a number of the species have a sub-acid taste, and are eaten in S. America, and preserved with sugar; and they are occasionally used thus in some other countries. Where the climate admits, a fuchsia hedge is extremely ornamental. The wood of some species is used in their native regions for dyeing black.

FUCHSIN, n. *fôk'sĭn:* red coloring matter derived from rosaniline.

FUCINO, *fô-chē'nō*, LAKE OF, or LAGO DI CELANO, *lâ'gō dē chā-lâ'nō* (anc. *Fucinus Lacus*): lake of Italy, province of Abruzzo Ultra II.; remarkable as the only lake of any extent in the Central Apennines. It is 10 m. long, 7 broad; 2,176 ft. above sea-level. It is subject to sudden risings; and in ancient times, by order of Emperor Claudius, a magnificent subterranean channel more than three m. in length, to carry off the surplus waters, was cut partly through the solid rock of Monte Salviano rising 1,000 ft. above. This tunnel became obstructed in the middle ages, and long remained so, notwithstanding many attempts to clear it. In recent times the surrounding country has been often submerged. In 1855, operations were commenced for the restoration of the Claudian aqueduct, and 1862,

Aug. 9, the work was completed. Previous to 1871, about $100,000,000 were expended upon the drainage of this lake.

FUCIVOROUS, a. *fū-sĭv′ō-rŭs* [L. *fūcŭs*, sea-weed; *vŏrō*, I devour]: eating or living on sea-weed.

FUCO-XANTHINE, n. *fū′kō-zăn′thĭn* [L. *fūcŭs*, a rock-lichen, sea-weed: Gr. *xanthos*, yellow]: a brown coloring matter, found in sea-weeds.

FUCUS, n. *fū′kŭs*, FUCI, n. plu. *fū′sī*, or *fū′kē* [L. *fūcŭs;* Gr. *phukos*, rock-lichen, certain sea-weeds used by the ancients in dyeing]: sea-weed or sea-wrack (see FUCACEÆ: WRACK). FUCOID, a. *fū′koyd*, or FUCOI′DAL, a. [Gr. *eidos*, likeness], resembling sea-weed. FU′COIDS, n. plu. fucus-like impressions. FUCITES, n. plu. *fū-sīts′* or *fū-sī′tēz*, a general term for fossil sea-weeds.

FUCUSINE, n. *fū′kŭs-ĭn:* $C_{15}H_{12}F_2O_3$. An organic base prepared by boiling fucusamide with aqueous potash for twenty minutes. It forms a yellowish resin.

FUCUSOL, n. *fū′kŭs-ŏl:* fucus aldehydes, $C_5H_8O_2$, or $C_4H_3O{\cdot}CO{\cdot}H$; obtained by distilling sea-weed with dilute sulphuric acid and washing the distillate with water.

FUD, n. *fŭd* [W. *ffwtog*, a short tail; a scut]: the scut, or tail of a hare, rabbit, etc.; woolen waste; the refuse of the new wool taken out in the scribbling process, which is mixed with the mungo for use.

FUDDLE, v. *fŭd′l* [Low Ger. *fuddig*, confused: Ger. *faseln*, to rave or dote: comp. Gael. *fadail*, tedious, a long time]: to sit long over liquor; to make tipsy; to stupefy one's self with drink. FUDDLING, imp. *fŭd′lĭng*. FUDDLED, pp. *fŭd′ld*. FUDDLER, n. *fŭd′lẽr*, one who stupefies himself with drink; a drunkard.

FUDGE, int. *fŭj* [prov. F. *fuche*, an imitative word: comp. Gael. *fuidse*, a craven]: an exclamation of contempt; nonsense.

FUDGE FAMILY IN PARIS. A satire written by Thomas Moore in 1818, the under-bred English in foreign countries being the subject.

FUEL. Oxygen being the most chemically active constituent of the atmosphere, it follows, necessarily, that the substances which can be used for fuel must be such as combine with oxygen and, in doing so, evolve considerable quantities of heat. This affords a wide field for choice, but certain practical considerations limit the selection considerably. For instance, the material used for fuel must be available in large quantity, at a relatively cheap price; it must be capable of ignition with tolerable ease; the heat evolved must not be at too high a temperature, otherwise the container (furnace, stove, etc.) would melt; the products of combustion must not be too offensive and must be capable of easy disposal and, finally, the material selected must continue to burn readily and steadily, not merely in pure oxygen, but in the diluted gas such as is found in air. These and other considera-

tions render it practically impossible to use such things as iron, or aluminium for fuel and as a fact it is found that mankind invariably uses compounds of carbon which, with the possible exception of petroleum and its products, are always of a vegetable origin. In this article only the chief materials used for fuel will be considered. It would occupy too much space to attempt to give an account of all the special substances, the use of which is confined to a small part only of the world. As examples of such peculiar materials may be mentioned the dried excretion of camels and other herbivoræ, which is used, because of the undigested vegetable fibre which it contains, in some parts of Africa and Asia where wood is unobtainable. As another instance may be mentioned the extensive employment, in Southern Italy, of the vegetable refuse from olive presses.

For present purposes it will probably be most convenient not to classify fuels with respect to their chemical composition, or mode of origin, but to divide them according to their physical state, under ordinary conditions, as gases, liquids, or solids.

Gaseous Fuel.—In many respects this is the best and most convenient fuel because it can be applied directly where it is required, it leaves no ash and the quantity burned and, therefore, within limits, the temperature obtained can be regulated with the utmost facility. The chief drawback to its use is the high cost in most places. This is due essentially to the fact that, under ordinary conditions, one gas supply has to be capable of serving not only for heating purposes, but also for illumination in an ordinary burner. This increases considerably its cost of production. Gas suitable for heating will give a thoroughly satisfactory light if an incandescent mantle burner is employed and, now that these are so cheap, it is not fair that the most progressive people in a city should be taxed heavily in the price of their gas because a few persons are so indolent or ignorant as to continue the use of ordinary burner. *Natural Gas* occurs in enormous quantities in different parts of the world, chiefly in the 'oil belt' of the United States and in Caucasia. It is an excellent fuel, though its illuminating power is apt to be rather low. Its average percentage composition, by volume, is as follows: methane 67, hydrogen 22, oxygen 0.8, nitrogen 3, ethane 5, ethylene 1, carbon dioxide 0.6, carbon monoxide 0.6. The composition may vary between the following limits: methane 60–80, hydrogen 5–20, nitrogen 1–12, ethane 1–8, ethylene 0–2, carbon dioxide 0.3–2.0, carbon monoxide a trace. The origin of Natural Gas is not known with certainty, but there can be no doubt that it was formed under the same conditions as those which led to the production of petroleum, to which it is closely related. These are discussed more fully in conjunction with the latter substance. In 1896 the value of the Natural Gas obtained in the United States was $13,002,-512, in 1900 and 1905 these figures had risen to $23,698,-

674 and $41,562,855, respectively. *Coal Gas* is produced by heating bituminous, or 'soft' coal, in the absence of air. Coke remains in the retorts and the volatile matter is cooled in order to separate tar. The gas is also passed upwards through towers containing wooden gratings or other substances to present a large surface over which a stream of water passes. This absorbs ammonia and other impurities. Sulphur compounds are removed by passage over oxide of iron and slaked lime and the remaining tar is eliminated by treatment with sawdust. In countries where coal is cheap and petroleum relatively expensive, all the illuminating gas is made in this manner. (See *Water Gas.*) The composition of Coal Gas varies greatly according to the nature of the coal employed and it also depends on the details of manufacture. In general, it consists largely of methane and hydrogen, together with ethane, ethylene, acetylene, benzene, toluene, carbon monoxide, nitrogen and more or less naphthalene, carbon dioxide, sulphur compounds and oxygen. The presence of the latter shows that air has been allowed to enter the pipes. The sulphur compounds, when burnt, give sulphur dioxide which condenses readily with moisture and then settles on the walls of the room, and finally forms sulphuric acid. It is to this substance that the destruction of curtains, wall-paper, book-bindings, etc., and the tarnishing of silver articles is due. The same remarks apply, of course, to the sulphur contained in any other fuel. The poisonous action of coal gas depends on the presence in it of carbon monoxide and its illuminating power is due chiefly to its content of acetylene, benzene and toluene. As a rule, the gas from ordinary bituminous coal has a rather low illuminating power; it is increased by the use of a mixture of bituminous and cannel coal, which latter is relatively expensive. *Oil Gas* is prepared by forcing petroleum into bright red-hot retorts and is purified essentially in the same manner as coal gas. It contains only traces of hydrocarbons of the methane series, but large quantities of ethylene and dimethylacetylene, $H_3CC{:}CCH_3$, are present, together with benzene, toluene and their homologues (see CHEMISTRY) and also the homologues of ethylene. It is compressed in steel cylinders and is employed chiefly for the lighting of railroad cars, buoys, etc., where a bright light from the least quantity of gas is required. It is too costly for general use. Under ordinary conditions about 80 cu. ft. of gas per gallon of oil may be obtained. *Wood Gas* is produced by heating wood in retorts, the yield being 20–37 per cent. of the weight of the wood and depending, of course, on the nature of the latter and on the conditions of working. Its average percentage composition is methane 11, carbon monoxide 40, carbon dioxide 26, and hydrogen 23, smaller quantities of other substances being also present. Wood Gas requires to be 'enriched' by mixing with it some acetylene or benzene hydrocarbons before it can be employed for illumination. It is not well

adapted for use as a fuel because the large percentage of carbon dioxide present reduces the temperature of the flame. In places where coal and petroleum are costly as compared with wood, the gas is manufactured for its own sake, but it is usually produced during the preparation of *charcoal* (q.v.) and is burned under the retorts or steam boilers. The removal of the carbon dioxide is tedious and very costly. *Water Gas* is the name applied to the mixture of gases obtained by passing steam over highly heated coke. The latter is placed in large upright furnaces and is brought to the necessary temperature by means of a blast of air. When this is shut off steam is passed in, and the resulting gas collected, the process being repeated at regular intervals. Water Gas contains 45–56 per cent. of hydrogen, 36–44 per cent. of carbon monoxide and 4–12 per cent. of carbon dioxide and nitrogen, these latter being derived from air. It gives a very hot flame with hardly any luminosity and is largely used for industrial purposes such as steel and glass making and as a fuel for gas engines. Its use requires care, because it has little odor and is highly poisonous. The greater part of the illuminating gas used in this country consists of a mixture of Water Gas and oil gas. The former, before it leaves the furnace, is mixed with petroleum vapor, and is decomposed by the heated walls of the furnace in the manner described under *Oil Gas*, the purification of the resulting material being effected by the process mentioned under *Coal Gas*. Occasionally the coke referred to above is substituted by anthracite. *Producer Gas* varies considerably in composition, according to the method of its preparation. It is obtained most simply by passing air over heated coal. The more complicated compounds formed from the coal itself are converted into carbon monoxide, a little carbon dioxide is also produced and there is, necessarily, also present the nitrogen contained in the original air. The following analysis was made of Producer Gas from anthracite: hydrogen 6.0 (6.5), methane 3.0 (1.9), carbon monoxide 23.5 (23.7), carbon dioxide 1.5 (5.3), nitrogen 65.0 (62.6), and water 1.0. The figures refer to percentages, those in parentheses give the composition of a Producer Gas from coke. Producer Gas has the advantage not only of being a *gas* (see above), but also of being capable of preparation from coal of very poor quality, or even from certain kinds of shale. Instead of air alone Producer Gas is often made from a mixture of air and steam, it then approximates more closely to water gas in composition, *i. e.*, the proportion of hydrogen and carbon monoxide rise and that of nitrogen falls. Sometimes the air is replaced more or less completely by *Furnace Gas* (see below) and occasionally a mixture of air, furnace gas and steam is employed. *Furnace Gas* or *Furnace Waste Gas* is the gaseous mixture which escapes from the top of blast furnaces (see IRON). It may contain about 25–29 per cent. of carbon monoxide, the remainder being

chiefly carbon dioxide and nitrogen. It can be used in making Producer Gas (see above), but is often burned directly. It does not give a very high temperature because of its great dilution and the temperature which it does give may vary considerably, according to the condition of the charge in the furnace. It is used chiefly for such purposes as steam raising, heating air for a hot blast, brick-burning, ore roasting, the drying of fuel, etc. *Air Gas* is the term applied sometimes to the explosive mixture of air and the vapor of gasoline or petroleum spirit. It is usually produced, as required, by passing air through gasoline, or by saturating some porous material with the latter and then drawing air over it. Air Gas is used essentially on account of its explosive power for actuating small motors, as in boats or automobiles; strictly speaking it is not employed as a fuel.

Liquid Fuels.—The principal fuels of this nature are petroleum and its products such as kerosene and gasoline, the 'heavy oils' from coal tar and also, in some countries, alcohol. Liquid Fuels must, of course, be converted into vapor before they can be burned. Next to gas *alcohol* is probably the ideal fuel; it burns readily, is not specially dangerous to store and gives a fairly hot, absolutely smokeless flame. Its only drawback is the high duty levied on it in many countries. The use of *kerosene* is too well known to need more than a brief description. It is, of course, usually burned by means of a wick, but the air supply is not quite the same in a kerosene stove as it is in a kerosene lamp. Under ordinary conditions the flame is smoky. *Gasoline* is burnt in a stove of special construction, containing a heated chamber in which the Gasoline is volatilized and the vapor mixed with air. This mixture burns with a non-luminous flame, which is not smoky and is similar in all respects to the blue flame of a gas stove, or of a mantle burner. The only difference is that the gas is supplied to the gas stove ready made, whereas the Gasoline stove has to make its gas as well as burn it. Gasoline stoves are not dangerous provided they are kept clean, and the reservoir is not allowed to become empty. Gasoline evolves vapor which with air forms a mixture that explodes on the application of a flame. (See *Air Gas.*) Of course the Gasoline stove must be well constructed and be free from leaks. *Heavy coal tar oil*, so called because it is heavier than water, and *petroleum* may be considered together. They are burned under the steam boilers of locomotive engines and steamships, especially in some of the western regions of the United States and also around the Black Sea. The peculiar advantages of their use are freedom from ash, economy of labor and storage room and easy regulation of the temperature; the disadvantages are the relatively small supply of material and the cost, except in a few places. When used the petroleum or oil is converted into spray by a blast of air and through mixture of air and very finely divided liquid is burned at the nozzle

of the apparatus, in the same manner as is commonly seen, on a very small scale, in the blast lamps used by painters and plumbers, but of course, with petroleum a much stronger blast is required. Crude petroleum contains about 85 per cent. of carbon and about 15 per cent. of hydrogen, together with sulphur and small quantities of nitrogen, etc. It appears to have a similar origin to natural gas, the former consisting of the higher and this latter of the lower homologues of several series of hydrocarbons. The following figures give the value and quantity of crude petroleum obtained in the United States during the years mentioned. The figures refer to barrels containing 42 gals. In 1896, 60,960,361, value $58,518,709; 1900, 63,620,529, value $75,989,313; 1905, 134,717,580, value $84,157,399.

Solid Fuels differ so widely in composition and properties that it will be most convenient to consider each variety separately. Wood is, doubtless, the most ancient fuel, as it is also the least efficient. As regards the composition of wood it is impossible to attempt to give any but *average* analytical results, because of the enormous number of species of trees and shrubs which are known, but this is of less importance than might be expected. The differing behavior of various woods, especially when considered as fuel, is due chiefly to variety of structure, including such factors as density and closeness of the grain, and only in a relatively minor degree to variation in composition. This statement applies even to coniferous wood, such as pine, etc., because, in its ultimate chemical constituents, resin does not differ greatly from cellulose. Wood contains about 4 per cent. of sap and 96 per cent. of tissue, chiefly cellulose or similar material. When recently felled a large proportion of water is also present. Excluding ash, well dried wood contains 50 per cent. of carbon, 6 per cent. of hydrogen, 42 per cent. of oxygen and 2 per cent. of nitrogen. The ash amounts to about 1 per cent. of the total weight. It is evident that the hydrogen and oxygen which are in partial combination constitute about half the total weight of the wood; their complete conversion into water produces relatively little heat and the water, when formed, must be volatilized at the cost of heat produced by the combustion of the 50 per cent. of carbon, consequently, the cause of the inefficiency of wood as a fuel may be expressed broadly by saying that a considerable portion of the heat given by one half of it is used up in volatilizing the other half, which itself gives no heat. In most civilized countries wood is only used in special localities, or as an article of luxury. Air-dried wood contains 20 per cent. of moisture, 40 per cent. of carbon, including ash, and 40 per cent. of partially combined hydrogen and oxygen. *Peat* may be regarded as being the first step in the conversion of vegetable matter into coal. The changes take place in the almost complete absence of air and in the presence of water, and they result in a reduction of the volatile constituents of the wood, especi-

ally of the oxygen, and an increase in the proportion of carbon and ash. When freshly cut from the bog peat contains 90 per cent. of water. After drying in air this is reduced to 15–20 per cent., together with about 44.5 per cent. of carbon, 4.5 per cent. of hydrogen, 20.5 per cent. of oxygen and nitrogen and 8.5 per cent. of ash. Sometimes the ash content may rise to 50 per cent. The best form of peat is that which has dried artificially and then compressed into briquettes; this treatment may raise the carbon and hydrogen content to approximately 53 and 5 per cent., respectively. The remarks about the water in wood apply, of course, to peat, which is only used in poorer countries, such as Ireland, where coal is absent. *Brown Coal* or *Lignite* may be regarded conveniently as representing the next stage in the mineralization of vegetable matter. Brown Coal is subdivided into *fibrous lignite*, containing when free from ash, about 60 per cent. of carbon, 5 per cent. of hydrogen and 35 per cent. of oxygen. *Conchoidal Lignite* is composed of 75 per cent. of carbon, 5 per cent. of hydrogen and 20 per cent. of oxygen. The ash is usually 5–15 per cent. of the total weight of the Lignite and may reach 50 per cent. Lignite also contains a good deal of sulphur, free or combined. The above figures show that here again, as compared with wood, the proportion of oxygen has decreased and that of carbon has risen. When distilled Lignite gives a high proportion of paraffinoid hydrocarbons. As a fuel it is not very efficient on account of the high percentage of oxygen and ash. *Cannel Coal*, from the Scotch candle, is a variety of Lignite which burns with a bright flame. *Bituminous Coal* is a rather misleading term applied to coals which burn with a smoky flame and which are about midway between lignite and anthracite. It corresponds to the popular term 'soft coal.' Bituminous Coal may be divided, conveniently, into the following four classes, having the general composition shown below; it must be understood, however, that for any special purpose, composition alone is a very uncertain guide in the selection of a coal and it is necessary to consider the behavior of a particular coal under the actual conditions of use. Many analyses purport to give the amounts of 'fixed' carbon (coke) and of volatile combustible matter, etc., but, apart from the varying results obtained from the same coal by different analysts, the figures are by no means sufficient to enable the behavior of an otherwise unknown coal to be foretold with certainty. This is not surprising because coal is an extremely complex mixture of many complicated compounds, of which little is known. The composition of the four classes of Bituminous Coal, free from ash, follow: (1) *Dry coal*, burning with a long flame; 75–80 per cent. of carbon, 4.5–5.5 of hydrogen and 15.5–19.2 of oxygen and nitrogen. (2) *Caking coal*, burning with a long flame, used for making coal gas; 80–85 per cent. of carbon, 5–5.8 per cent. of hydrogen and 10–14.2 per cent. of oxygen and nitrogen. (3) *Caking*

coal proper, 88–89 per cent. of carbon, 5–5.5 per cent. of hydrogen and 5.5–11 per cent. of oxygen and nitrogen. (4) *Caking coal* (flat coal), burning with a short flame; 88–91 per cent. of carbon, 4.5–5.5 per cent. of hydrogen and 4.5–6.5 per cent. of oxygen and nitrogen. As compared with lignite, we see in these coals a further increase in the proportion of carbon and a reduction in that of oxygen and nitrogen. When heated in absence of air Bituminous Coal gives tar which contains chiefly derivatives of benzene. *Anthracite*, also called 'hard coal,' is found only in a few parts of the world, chiefly in Pennsylvania, Belgium, and South Wales; this last deposit is of special value for use with marine steam boilers, as it gives a great heat, burns comparatively freely and produces little smoke or ash. The composition of anthracite is, approximately, as follows: 91.3 per cent. of carbon, 3.0 per cent. of hydrogen, 2.75 per cent. of oxygen and nitrogen and 3 per cent. of ash. The content of nitrogen varies from 0.6–2.85 per cent. and that of sulphur from 0.6 to 1.0 per cent. Anthracite gives very little smoke or volatile matter, and produces a high temperature, but in order to burn it special furnaces with an adequate draft are necessary. This, and also its relatively high cost, hinder its use; the reduction of the smoke nuisance in cities will come rather from the greater employment of gas than from an increased use of anthracite. In 1906 the United States produced 414,039,581 tons of coal (2,000 lbs. per ton), valued at $512,610,744. This represented, in one year, an increase of 5.4 per cent. in quantity and 7.5 per cent. in value. Pennsylvania produced 200,546,084 tons, representing 48.4 per cent. of the total quantity and 51.1 per cent. of the total value, the difference between the value and quantity being due to the large proportion of anthracite. *Coke* is produced in the production of coal gas (see above), but is largely manufactured by heating certain varieties of coal in the absence of air. In the best coke ovens coal is fed in continuously as coke is withdrawn, and the volatile matter is collected, the gas being washed with water to remove ammonia, and then burned under the oven. The tar is worked up for benzene and other valuable products and the ammonia is employed in the manufacture of fertilizer, etc. Coke may be burned in furnaces constructed for anthracite, but it is chiefly used for the smelting of iron and other ores, because it gives an intense heat. Its composition approximates to that of anthracite, the percentage of carbon may reach 93, that of the ash varies from 1–30 and there is generally 2–3 per cent. of moisture, but in some cases this proportion is doubled. Its presence is due to the fact that when the coke is withdrawn from the oven it is often quenched with water so as to prevent its burning away before it cools. It may be added that only coke with a low ash content, not exceeding 5 per cent., can be used in the manufacture of steel. *Charcoal* is prepared by heating wood in absence of air. It contains,

therefore, all the ash of the original wood and bears the same relation to it that coke does to coal. Charcoal is used as a fuel in various metallurgical processes and, occasionally, for cooking. It is also burned in small stoves in Europe, China and other parts of the world, In some cases these stoves are large enough to heat a room. in others they are so small that they can be put in a foot-stool, or be carried in the hands or in a muff. Charcoal is an admirable fuel on account of its freedom from sulphur and also because it evolves no smoke or odoriferous material when burnt. Almost the only drawback to its use is its relatively high price. It contains about 90 per cent. of carbon, 3 per cent. of hydrogen and 7 per cent. of oxygen, the ash being disregarded. After being stored it may absorb as much as 14 per cent. of moisture and also gases from the atmosphere in varying quantity. The percentage of ash is 3–4. Charcoal which is to be used for making gunpowder is prepared at a lower temperature and is, therefore, brown, *i.e.*, it is incompletely carbonizèd. It contains more volatile matter than black charcoal.

FUENTES DE ONORO, *fwĕn'tĕs dā ō-nō'rō* (Fountains of Honor): small village of Salamanca, Spain, on the Portuguese frontier, 14 m. w. of Ciudad Rodrigo; scene of one of the important battles of the Peninsular war, between the English under Wellington, and the French under Massena. Wellington, who had resolved to abide battle, drew up his forces between the Coa and the Agueda, his line extending n. and s. about seven miles, and his right wing stretching two m. s. of Fuentes de Onoro. 1811, May 3, this village was fiercely attacked by a strong body of French troops, who forced the English from the streets, and were not dislodged until the English, reinforced by three regiments, drove them by a terrific charge from their position, with a loss in all of 300 men. On the 5th, the battle proper commenced. The French, much stronger than their enemies in both cavalry and infantry, assailed Wellington's right with overwhelming numbers, and though prodigies of valor were performed by the English—as in the case of Ramsey's brigade of horse-artillery, which cut its way through a solid body of cavalry —their right wing was turned, and their position lost. Never during the war were the English forces more perilously situated. Meanwhile, at Fuentes de Onoro, on which Wellington's *left* wing now rested, a fierce battle was being fought. The three English regiments who had been left in occupation made a desperate resistance against assailing multitudes. The fight lasted here till evening, reinforcements having been brought up on both sides; and the night closed upon the English holding the crags above the town, and the retiring regiments of the French. The loss of the allies amounted to 1,500, while that of the French, stated at the time as nearly 5,000, was certainly greater than that of the allies. Neither army could claim a decided advantage in this battle; but its result was, that

on the 10th the French were forced across the Portuguese frontier; and thus ended the French invasion of Portugal.

FUERO, *fû-ā'ro* [Sp.—from L. *forum*]: strictly, seat of justice, or jurisdiction; but in this last sense, was transferred to collections of laws, specially to the civic rights by charter or laws granted by Spanish kings to individual cities, the most famous of which were the fuero of Leon and that of Naxera. As these city charters contained for the most part special liberties, concessions, and privileges, the word fuero became current chiefly in this sense, and was particularly so applied to designate the body of privileges and liberties that made up the constitution of Navarre, and of the three Basque provinces of Biscaya, Alava, and Guipuzcoa. These are the fueros the maintenance of which gave rise to wars in the Basque provinces 1833. The fueros of other provinces and cities of Spain have long been extinct.

These Basque fueros were grounded on the old laws of the Visigoths, and grew up in the period between the irruption of the Moors into the Spanish peninsula and the consolidation of the Spanish monarchy under the House of Hapsburg. The same was the case in the half-Basque province of Navarre, which formed an independent kingdom under its own sovereigns. The fueros were thus the joint product of the ancient Gothic laws—those fertile sources of modern rights—and the new circumstances in which those laws came to work. They resulted by degrees, here as elsewhere, in a struggle between the people and the princes; and their development forms an interesting chapter in the history of modern constitutionalism. They were at first only privileges and statutory rights granted to single places, and from these were extended to others. By the introduction of the representative element of the Cortes, and extension over whole provinces, they were then transformed, in virtue of the general law of custom, into constitutional rights of these provinces; and were in time collected and formally embodied and sanctioned as such. It was in this way that the fueros of Navarre, which had been growing into consistency for centuries previously, were, 1236, during the contests between King Theobald and his Cortes, collected and recorded, and remain yet under the title of *Cartulario del Rey Tibaldo*. Ferdinand the Catholic, who united Navarre with the crown of Castile, maintained the fueros, adapting them to the new relation to Castile. Their leading provisions were these: The Cortes, chosen for three years; and consisting of the three estates of clergy, nobles, and commons, are to meet yearly; and without their consent, no law can be passed, or anything of importance undertaken. The government consists of the viceroy, who presides in the Cortes and Great Council; the Great Council of Navarre (a body similar to the old French parliaments); and the Contaduria, before which all accounts of revenue and expenditure must be laid. There is no custom-house or toll but at the frontier, and except the trifling grant of

176,000 reals, nothing flows into the royal treasury. All these fueros the king had to bind himself by a royal oath to maintain.

In the lordship (Señorio) of Biscaya, the fueros grew up in the contests of the inhabitants with their counts. They were collected into a code first by Count Juan 1371, which, after the final union of Biscaya with Castile, was recast (1526), completed, and confirmed by King Charles I. (German emperor Charles V.). According to this charter of rights, every new 'Lord'—for only so do the Biscayans style the king of Spain as their prince—14 years old, must come into the country within a year, and take the oath to uphold the fueros in certain places appointed for that purpose. The government consists of a corregidor, appointed by the 'Lord,' and two deputies; these, aided by six regidores, and forming the regimiento, conduct the administration. But the supreme power resides in the General Assembly (Junta General), which meets yearly under the tree at Guernica, and regulates all the affairs of the lordship, and appoints the deputies and regidores. Justice is administered, in the first instance, by the lieutenants (Tenentes) of the corregidor; in the second, by the corregidor and deputies; and in the third, by the royal court at Valladolid. Other privileges were, that every Biscayan of pure blood was counted noble; that except the post-office there was to be no royal governing board in the province; that Biscayans were not bound to serve in the Spanish army. The fueros of Alava and Guipuzcoa were of analogous origin and character, but differing in details. Abolished by Espartero, these fueros were restored by Queen Isabella 1844. In 1876 a law abolishing the Basque fueros was adopted, and 1877 a decree was passed, assimilating the administration of the Basque provinces to that of Spain.

FUERTES, James Hillhouse, American civil and sanitary engineer: b. Ponce, Porto Rico, 1863, Aug. 10. He was educated from Cornell University in 1883. He has contructed works for the sewerage, drainage and water supply of various cities in the United States, Canada and Brazil, and is a non-resident lecturer at Cornell.

FUERTES, Louis Agassiz, American painter of birds: b. Ithaca, N. Y., 1874, Feb. 7. He was graduated from Cornell University in 1897. He has illustrated: *Birding on a Broncho* (1896); *Citizen Bird* (1897); *Song Birds and Water Fowl* (1897), and other books.

FUERTEVENTURA. See Canaries.

FUGACIOUS, a. *fū-gā′shŭs* [L. *fŭgācem*, swift—from *fŭgĭō*, I fly: It. and F. *fugae*)]: fleeting; volatile; unstable; in *bot.*, evanescent; falling off early. Fuga′ciousness, n. the quality of flying away. Fugacity, n. *fū-găs′ĭ-tĭ*, act of flying away; volatility; uncertainty. Fugitive, a. *fū′jĭ-tĭv* [F. *fugitif*—from L. *fugĭtīvus*]: apt to flee away; flying; volatile; escaping readily: N. a running away; a deserter. Fu′gitively, ad. *-lĭ*. Syn. of 'fugitive, a.': fleeting; unstable; uncertain; wandering; eloping; evanescent.

FU'GÆ: see FUGIE WARRANT: MEDITATIO FUGÆ.

FUGARO, *fô-gâ'rō*: stop, of the flute kind, in some organs; of 4-ft. pitch, sometimes of 8-ft. pitch; of a small scale, made of wood or tin. In tone it is as piercing as the *gamba*, but much clearer.

FUGGER, *fûg'gėr*: one of the most remarkable families in Germany, which, rising by industry and commerce, has founded numerous lines of counts and even princes.

The ancestor of the family was JOHN FUGGER, master-weaver in Graben, near Augsburg. His eldest son JOHN FUGGER, acquired by marriage, 1370, the freedom of Augsburg, and began a trade in linen, with weaving. By a second marriage, 1382, with the daughter of a councilor, he had two sons and four daughters. This John Fugger was one of the council of twelve (Ger. *Die Zwölfer*, 'the twelvers') in the weaver-guild, and an assessor of the famous Fehmgericht (q.v.) or secret tribunal of Westphalia. He died 1409, and left what was a large fortune for the time—3,000 guldens or florins.

His eldest son, ANDREW FUGGER, made such good use of his share of the inheritance that he got the name of 'the Rich Fugger.' By marriage, he founded a noble line, which, however, died out 1585. John's second son, JACOB FUGGER, (d. 1469) was superior and 'twelver' of the weaver-guild, and held in high esteem by his fellow-citizens; he was the first of the Fuggers that had a house in Augsburg, and he carried on an extensive commerce.

Of his seven sons, three, Ulrich, George, and Jacob II., by industry, ability, and integrity, extended their business to an extraordinary degree, and laid the foundation for the splendor of the family. They married into the noblest houses, and were raised by the emperor Maximilian to the rank of nobles. The emperor mortgaged to them, for 70,000 gold guldens, the county of Kirchberg and the lordship of Weissenhorn, and received from them afterward, through the mediation of Pope Julius II., 170,000 ducats, to assist in the war against Venice. ULRICH FUGGER (1441–1510) applied himself specially to the commerce that he opened with Austria, and there was almost no object that did not enter into his speculations; even the master-pieces of Albert Dürer went through his hands to Italy. JACOB FUGGER (1459–1525) engaged in mining; he farmed the mines in Tyrol, and accumulated immense wealth; he lent to the Archduke of Austria 150,000 guldens and built the magnificent castle of Fuggerau, in Tyrol. Thus the wealth of the Fuggers accumulated: their wares went to all lands, and scarce a road or sea but bore their wagons or ships.

Under Charles V. the house attained nearly its greatest splendor. Jacob Fugger having died childless, and the family of Ulrich Fugger also being extinct, the fortunes and splendor of the house rested on the sons of GEORGE FUGGER (d. 1506). At his death, he left three sons, one of whom, MARCUS FUGGER, entered the priesthood; the

two younger, Raimund Fugger and Antony Fugger, carried on the business, and became founders of the two chief and still flourishing lines of the House of Fugger. The two brothers were zealous Rom. Catholics, and with their wealth supported Eck in his opposition to Luther. During the diet held by Charles V. at Augsburg, 1530, the emperor lived in Antony Fugger's splendid house in the Wine Market. On this occasion he raised both brothers to the rank of counts, and invested them with the still mortgaged properties at Kirchberg and Weissenhorn; and a letter under the imperial seal conferred on them the rights of princes. For the support that they afforded him in his expedition against Algiers 1535, they received the right of coining money. Antony Fugger at his death left six million gold crowns in ready money, besides jewels and possessions in all parts of Europe and in both Indies. It is of him that Emperor Charles is said to have remarked while being shown the royal treasury in Paris: 'There is a linen-weaver in Augsburg that could pay all that out of his own purse.'

Emperor Ferdinand II. raised the splendor of the House of Fugger still higher while confirming the imperial letter of Charles, by conferring great additional privileges on the two oldest of the family, Counts John Fugger and Jerome Fugger. The Fuggers continued still as nobles to carry on their commerce, and further increased their immense wealth. They attained the highest posts in the empire, and several princely houses prided themselves on their alliance with the House of Fugger. They possessed the most extensive libraries and collections of objects of art, maintained painters and musicians, and liberally encouraged art and science. Their houses and gardens were master-pieces of the architecture and taste of the times. There is thus nothing incredible in the story that Antony Fugger, on one occasion when Charles V. was his visitor, lighted a fire of cinnamon wood with the emperor's bond for money lent him. While thus indulging in splendor, they were not backward in doing good. Ulrich, George and Jacob, sons of the beneficent Jacob Fugger, bought houses in one of the suburbs of Augsburg, pulled them down, and built 108 smaller houses, which they let to poor citizens at a low rent. This was the origin of the 'Fuggerei,' which remains under the same name, with its own walls and gates. Many other benevolent institutions were established by Antony Fugger and his sons. It is questionable if we are to rank among their benefactions their calling the Jesuits to Augsburg, and giving them buildings and revenues for a college, church and school.—The race is continued in the two principal lines of Raimund and Antony, besides collateral branches. The domains are chiefly in Bavaria. A collection of portraits of the most important members of this great house, executed by Domin. Custus of Antwerp, appeared in Augsburg (1593 et seq.). This collection (increased to 127, with genealogies in

Latin) was republished by the brothers Kilian (Augsburg 1618); and 1754, a new ed. of the work, further improved, containing 139 portraits, was published at Ulm, under the title *Pinacotheca Fuggerorum.*

FUGITIVE, in law, is a term applied to persons who having violated the laws of a state escape into a foreign territory. As one state cannot pursue criminals into the territories of another, the practice prevails among the more enlightened nations of mutually surrendering such fugitives to the justice of the injured state. This practice is founded on national comity and convenience, or on express compact. The United States recognize the obligation only when it is created by express agreement (see EXTRADITION). As between the states of the American Union, extradition is made compulsory by the Federal Constitution, Art. IV. Sec. 2, which provides that 'a person charged in any state with treason, felony, or other crime, who shall fly from justice and be found in another state, shall, on demand of the executive authority of the state from which he fled, be delivered up, to be removed to the State having jurisdiction of the crime'. In the several states there are statutory provisions or established usages regulating the procedure in such cases.

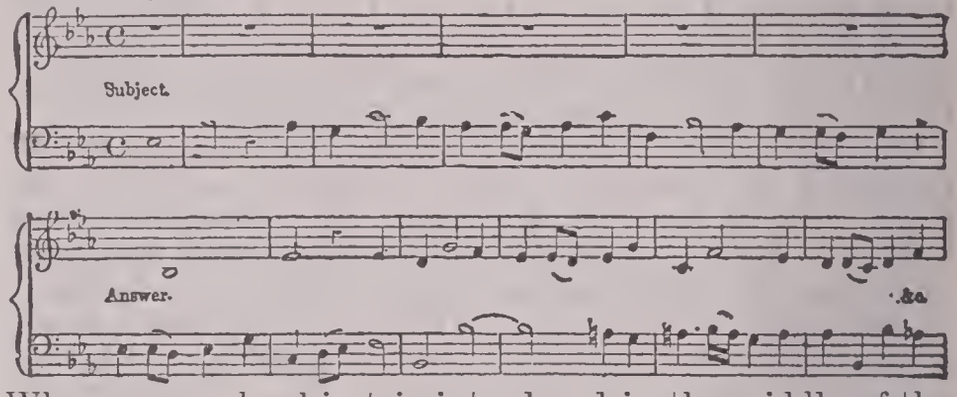
FU'GITIVE SLAVE LAW: former legal provision, under the constitution of the United States, for rendition of slaves escaping from their masters into other states whether slave states or free states. Slaves being regarded as property, things and not persons, as the Roman law puts it, the existence in every state in which slavery exists of a law recognizing the right of the master to reclaim his property follows as a logical consequence. Accordingly, the U. S. constitution, having recognized slavery, contained a number of enactments for its enforcement. By art. 4, s. 2 of that document, it was declared that persons held to service or labor in one state, under the laws thereof, and escaping into another, should be delivered up, on claim of the party to whom such service or labor might be due. Previous enactments were to a large extent superseded by the law of 1850, Sep. 18, imposing judicial duties, in arrest and return of fugitive slaves, on the U. S. commissioners, who might have the power of arresting or imprisoning for offenses against the United States; on the judges of the U. S. circuit and district courts, and of the superior courts of territories; and on such special commissioners as the respective courts might appoint. It was the duty of all U. S. marshals to obey and execute all warrants and process of such judges and commissioners; and after the arrest of any fugitives, such officers were liable for an escape with or without their assent. When any fugitive escaped into another state or territory, the owner, or his duly authorized agent, might pursue and personally arrest said fugitive, or might demand a warrant and arrest

from the officer having due authority. The fugitive was then to be taken before a commissioner or judge, whose duty it was to hear and determine the complaint in a summary manner. If satisfied of the validity of the claim and the identity of the slave, he had it for his duty to deliver to the claimant a certificate of the proceeding had, with authority to remove the fugitive to the place from which he had fled. The testimony of the fugitive was not admissible. Any assistance rendered to a fugitive to enable him to escape from the claimant, or any obstruction offered to his arrest, was penal, and also subjected the party to damages at the suit of the owner. All citizens of the United States were required, when called upon, to render the officers personal assistance in the performance of their duties. These provisions applied to all the states previously to the war, whether slavery was recognized by their special laws or not; the principal being that 'the constitution and laws of the United States secure the right to reclaim fugitive slaves against state legislation.' In some of the slave-holding states it was held, that if a slave from such a state went lawfully with his master into a non-slave-holding state, and acquired a domicile there with his master, or was emancipated there, he became emancipated, and ceased to be a slave if he should return; but if he were carried there for a temporary purpose, and returned, his state of slavery was resumed. These provisions did not apply to the fugitive slave (Kent. *ut sup.* ii. p. 297).

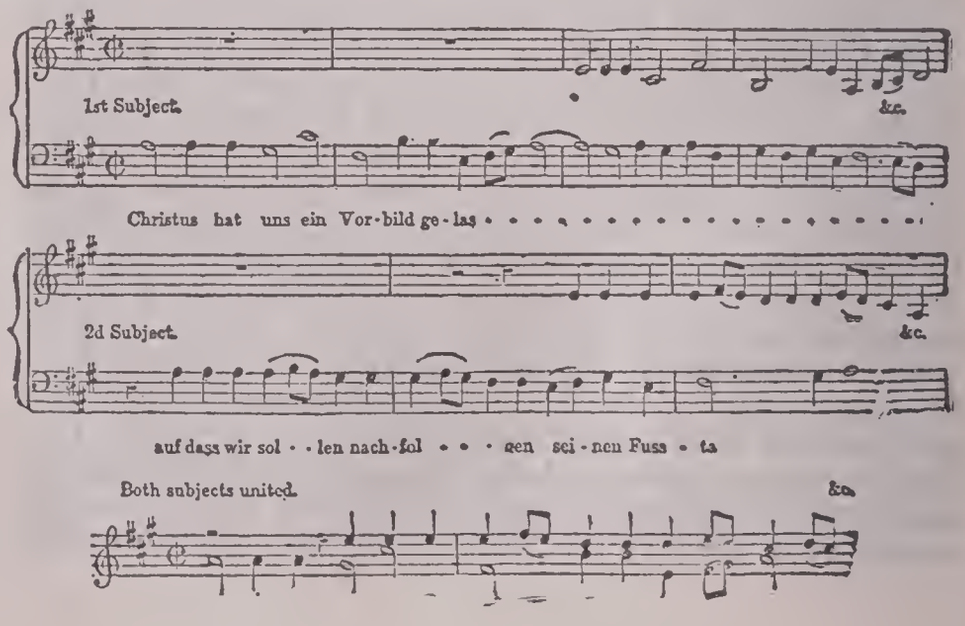
This law, which had become increasingly odious to the people of the northern states, was swept away by the storm of civil war which changed the constitution and abolished slavery throughout the land. Pres. Lincoln's Emancipation Proclamation, 1863, Jan. 1, was followed by the adoption of Articles XIII and XIV of the Amendments to the Constitution, and by the abolition of slavery by each of the former slave-states. See CONSTITUTION; SLAVERY.

FUGUE, n. *fūg* [F. *fugue*—from L. *fŭgă*, a flight or chase: It. *fuga*], in *music*, a piece in which the parts follow or chase each other with certain repetitions at intervals. FUGUIST, or FUGIST, n. *fū'gĭst*, one who composes or performs fugues. FUGA, a. *fū'ga*, a fugue. FUGAL, a. *fū'gal*, pertaining to or of the nature of a fugue. FUGATO, ad. *fū-gâ'tō*, in the fugue style, but not in strict fugue form.—In a *Fugue*, each part successively takes up the subject or melody. Any of the parts may begin the fugue, but the others follow according to fixed rules. The subject is generally a few bars of melody, given out in the principal key by the part which begins. The next part which enters repeats the same melody, but a fifth higher or a fourth lower, and is called the answer. The third part follows with the subject again in the principal key, but an octave higher or lower than the first part, and is answered by the fourth part in the same manner as the second part answers the first. After the subject is com-

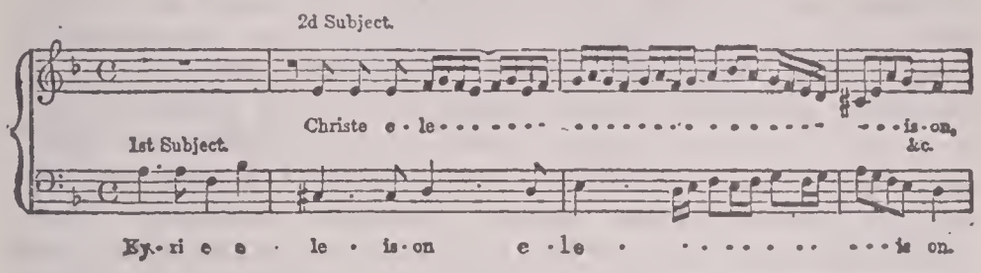
pleted, the melody which follows it, to form a continuation of the part, is called the counterpoint, in the construction of which, facilities for ingenious double counterpoints of various kinds are afforded. When the subject and answer have been introduced in all the parts, the first section of the fugue is said to be completed; an intermediate harmony of a few bars then follows, sometimes in its form like part of the subject, and with a modulation into a nearly related key. The subject and answer are again brought forward, but following in a different order from the first section; while all the parts are continued, and in some of them the original counterpoint appears either simply or inverted, the subject and answer forming the predominating idea throughout the whole composition, and toward the end appearing in a variety of forms, intervals, and modifications. When the subject does not extend its compass beyond half an octave, the answer is invariably made in the other half; and to avoid modulation out of the key, the progression of a fifth is answered by a fourth. A fugue consisting of one subject with a counterpoint throughout, is called a strict fugue, as in the following example by J. Sebastian Bach, in which the first progression of a fifth is answered by a fourth:



When a second subject is introduced in the middle of the composition, and afterward worked up with the first subject, the fugue is called a fugue on two subjects, as in the following from Graun's *Tod Jesu:*



A double fugue begins at once with two subjects in different parts, both of which are strictly treated throughout, as in the following from Mozart's *Requiem:*


2d Subject.
Christe e · le · · ·

FUH-KEEN, or Fu-Kian, or Fo-Kien (Happy Established or the Consummation of Happiness): one of the eastern maritime provinces of China; s. of Che-keang, between the parallels 23° 35′ and 28° 47′, and backed by the great southern range of mountains that separates s.e. China from the inland provinces. Fuh-Keen belongs to the hilly portion of China proper. It is a black-tea district, and produces barley, wheat, rice, tobacco, yams, and other Chinese vegetables. The principal fruits are the orange, li-chee, olive, plum, pomello (sub-acid fruit, somewhat like an orange), plantain, and mulberry. On its coasts are the ports of Fu-chow (q.v.) and Amoy, or Hia-mum (gate or harbor of Hia), opened by the treaty of Nankin, 1842, Aug. 29. See China. The island of Formosa and the Pang-hoo group were included in this group till 1884, when Formosa was made an independent (19th) province under a governor. Area, 38,502 sq. m. Pop. est. 25,790,000.

FUHNEN, *fü'nĕn* (Dan., *Fyen*): largest of the Danish islands after Seeland; bounded w. by the Little Belt which separates it from Jutland and Slesvig; n. by the Odensee Fjord; e. by the Great Belt; and s. by the Little Belt, and by the small island of Langeland which is incorporated with it in one circle, or *stift*, of the kingdom; area of this stift, 1,302 sq. m; pop. about 250,000.—The coast is generally rugged, and much indented with bays or fjords; but the interior is flat, except toward the s. and w. where there is a range of hills rising to about 500 ft. The land, well watered by several small streams, is fruitful and well cultivated, producing abundant crops of cereals. Barley, oats, buckwheat, rye, flax, and hemp are grown in larger quantities than are required for home consumption. Honey also is largely exported. The Fuhnen horses are in great request, and large numbers of them, and of a fine breed of horned cattle, are annually sent out of the island. The province of Fuhnen is divided into the two bailiwicks of Odensee and Svendborg. The principal towns are Odensee (q.v.), Svendborg (q.v.), and Nyborg, a fortified town on the e. coast. and the most direct port of communication with Seeland, and memorable as the seat of the annual Danehof, or meeting of the States, instituted 1354 by Valdemar IV., and for the victory gained 1659 by the Danes and their allies over the Swedes.

FUHRICH, *fü rich*, Joseph von: 1800, Feb. 9—1876, Mar. 13; b. Kratzau, Bohemia: painter. He settled in Vienna 1834: was the same year appointed custos, and 1841 prof. of composition and historical painting in the Imperial Acad. of Fine Arts: exhibited in the Paris exhibitions of 1855, 67; and was pensioned and appointed a knight of the order of Franz Joseph 1872. His paintings include the decoration of the villa Massimi; many scenes in the history of Bohemia: four grand cartoons representing the *Road to the Cross* in the church of St. Jean

Nèpomucène, Vienna; a *Pater Noster; History of St. Genevieve; The Triumph of Christ; The Glorifieation of Christ; St. Paul at Areopagus and Athens; The Confirmation at Samaria; St. Peter Preaching.*

FUIRENA, n. *fū-ĭ-rē'na* [named after G. *Fuiren*, Danish botanist]: typical genus of *Fuireneæ*, tribe of *sedges* (*Cyperaeeæ*).

FUL, postfix, *fûl* [from FULL 1]: a postfix denoting that the thing holds all it can contain. PAILFUL, n. enough to fill a pail; plu. PAILFULS. PAILSFULL, two or more each completely filled: so *mouthful*, as much as the mouth will contain; *mouthfuls*, the same mouth filled again and again; *mouths full*, the mouths of two or more persons filled.

FULAHS, *fô'lâz* [properly, *Fúlbe* (sing. *Púllo*)], or FELLANI (sing. Baféllanchi), or FELLATA, or FULLAN: name of a widely-spread negro people in Upper Súdán, regarding whose origin there is much diversity of opinion. Keane makes them, with the Nubas, the third of the seven distinct groups of African races (see AFRICA). Eichwaldt connected them with the Malays, but Barth says that 'none of his arguments are of any consequence.' Yet Dr. Barth is of opinion that 'their origin is to be sought for in the direction of the East; but this,' he adds, 'refers to an age which for us is enveloped in impenetrable darkness.' The Fulahs emerge into the light of history first about the beginning of the 14th c., when, as we learn from Ahmed Bábá's *History of Súdán*, two members of the tribe went on a religious mission from Melle, on the borders of Senegambia, to the king of Bórnu. The importance of this incident is in the fact, that it shows that in the dawn of their history—as has invariably been in later times—the course of the tribe was from *west to east;* also, that at the early period referred to, they were distinguished for that religious learning which still characterizes them. After the 14th c., successive swarms of Fulahs appear to have left the kingdom of Melle, or the mountainous region of Fuládu, and to have spread themselves over the greater portion of Súdán, 'absorbing and incorporating with themselves different and quite distinct national elements, which have given to their community a rather varying and undecided character.' Hence originate the conflicting accounts of travellers, some of whom speak of the Fulahs as differing little from the negroes; others, as having features and skulls of the European mold; while Bowen describes those of Yoruba as being some black, some almost white, and many of a mulatto color, varying from dark to very light. Many other tribes, not quite absorbed by the Fulahs are yet so far blended with them, that they have lost their native idiom altogether, and speak the language of the predominant race, which is termed the Fulfúlde. The Fulahs are not all under one ruler; they are a *raee*, not a *nation;* and have founded many kingdoms, such as those of

Sókoto, Gando, Timbo, etc. The numberless tribes belonging to their stock are generally divided into four groups or families, the Jel, the Baa, the Só, and the Berî. Most of them became converted to Mohammedanism about the middle of the 18th c., and in 1802, under the Imán Othman, commenced a religious war on the surrounding pagans, which terminated prosperously in the establishment of the great Fulah empire of Sókoto. Othman died in a sort of fanatical ecstasy or madness 1818. The Fulahs are industrious and inclined to trade; they work iron and silver, manufacture with great neatness articles in wood and leather, and weave various durable fabrics. They are by far the most intelligent of the inhabitants of Súdân, and have, besides mosques, schools in almost all their towns.

FULCRUM, n. *fŭl'krŭm*, FUL'CRA, or FUL'CRUMS, n. plu. [L. *fulcrum*, a prop—from *fulcīrĕ*, to keep upright]: in *mechanics*, a prop or support; fixed point at which any lever is sustained (see LEVER). In *bot.*, a general name for several of the appendages of the stem or leaves, which serve for support or defense. FULCRAR, a. *fŭl'krâr*, of or pertaining to fulcra.

FULDA, *fûl'dâ:* town of Germany, in the Prussian province of Hesse-Nassau, 54 m. s. of Cassel; pleasantly situated on a rising-ground on the right bank of the Fulda, a considerable stream, which, rising from the w. base of the Rhöngebirge, in Bavaria, flows n. through Hesse-Cassel, and unites with the Werra on the Hanoverian border, after a course of 110 m. F. is a pretty town, surrounded by old walls, and has a market-place, two squares, and eight suburbs. One of the chief buildings is the cathedral, the fourth church that has been built on this site. It is a handsome modern structure, and covers the shrine in which the body of St. Bonifacius was deposited after his murder by the Frisians 754. The other notable structures are the palace, formerly the residence of the prince-bishops of Fulda; the church of St. Michael, founded 822; a gymnasium, schools of art and manufactures, and a public library.—The Monastery of Fulda, founded 744, by Boniface, the 'apostle of Germany,' was long a most notable institution; a school of instruction and civilization in its earlier periods, and later a center of mediæval theological learning. It was looked to by Alcuin for help in founding universities on the continent of Europe, and became the source of many missionary monasteries. In 968 its primate was made primate of all the abbeys of Germany. As its wealth and power increased, it became corrupt; but attempts at reform were not lacking. In the 16th c., many of its monks seemed ready to welcome the reformation by Luther, but after a few years the authorities completely suppressed all evangelical tendencies.—The modern town has reputation for its linen manufactures; it has also extensive establishments for manufacture of vinegar and beer; with dye-

works, tanneries, and weaving. Pop. (1900) 16,900, mostly Rom. Catholics.

The *district* of which Fulda is cap. forms part of what was formerly the grand duchy of Fulda: this territory was incorporated with the grand-duchy of Frankfurt by Napoleon 1810, and ceded to Prussia 1815, but immediately afterward was made over to Hesse-Cassel (q.v.).

FULDA MANUSCRIPT, *fûl'da:* written copy of the Latin version of the New Test. prepared by command of Bp. Victor of Capua 546, and since carefully guarded in the famous abbey of Fulda (q.v.) in Hesse-Cassel, Germany. It is complete in all its parts, shows an effort to arrange the gospels in sequence of time, and was collated by Karl Lachmann, D.D., LL.D. (1793-1851), who made it the work of his life to prepare critical editions of the New Test. and the classics.

FULFIL, or FULFILL, v. *fûl-fĭl'* [from *full*, and *fill*]: to complete or carry into effect; to perform what is promised, expected, or foretold; to bring to pass; to answer, as a purpose or design. FULFIL'LING, imp.: N. accomplishment; completion. FULFILLED', pp. *-fĭld'*. FULFIL'MENT, n. or FULFILLMENT, completion; performance. —SYN. of 'fulfil': to accomplish; effectuate; realize; discharge.

FULGENT, a. *fŭl'jĕnt* [L. *fulgens* or *fugen'tem*, shining: It. *fulgente*]: shining; dazzling; exquisitely bright. FUL'GENCY, n. *-sĭ*, splendor; glitter.

FUL'GORA: See LANTERN-FLY.

FULGURATE, v. *fŭl'gū-rāt* [L. *fulgŭr*, a flash of lightning; *fulgŭrārĕ*, to flash, to lighten—from *fulgĕō*, I gleam: It. *fulgore*]: to emit flashes of light. FUL'GURATING, imp. FUL'GURATED, pp. FUL'GURA'TION, n. *-rā'shŭn*, the brightening of melted gold or silver. FULGURITES, n. plu. *fŭl'gū-rīts*, or FULMINARY TUBES, vitrified sand-tubes supposed to have originated from the action of the thunderbolt or lightning; found in sandbanks, and in soils consisting chiefly of silicious sand. They were discovered 1711 by pastor Herman, at Massel, in Silesia, and have since been found in many places; but their origin was pointed out first by Dr. Hentzen 1805. They are from a quarter of an inch to two inches and a half in diameter, their internal surface of a perfectly glassy substance, hard enough to scratch glass, and to give fire with steel. They are usually but not always, placed vertically in the sand, become narrower downward, and sometimes divide and subdivide into branches.—The term is applied also to the effects of lightning which seem to be exhibited in some places on rocks by vitrification and the production of a sort of enamel, sometimes assuming the form of beads.

FULHAM, or FULLAM, n. *fûl'ăm* [said to be from *Fulham*, a district of London once notorious for blacklegs]: in *OE.*, loaded dice: false dice.

FU'LICA. See COOT.

FULIGINOUS, a. *fū-lĭj'ĭ-nŭs* [mid. L. *fuligĭnōsus*, sooty—from L. *fū-lĭgō*, soot: It. *fuligine*]: sooty; smoky; smoke-colored.

FULIG'ULA. See POCHARD.

FULIMART: a spelling of FOUMART, which see.

FULL, a. *fûl* [Icel. *fullr;* Sw. *full;* Ger. *voll;* L. *plenus*, full: Ger. *füllen*, to pour liquids]: well supplied; holding all that can be contained; stored; stuffed; sated; complete; clear; distinct; mature; placed before certain words to strengthen their signification, as, *full* many a flower; perfect or complete, as a *full* moon: N. state of being satiated, as fed to the full; complete measure; highest state or degree; the whole or total: AD. without abatement; with the whole effect; completely; exactly, as *full* in the face. FUL'LY, ad. *lĭ*, completely; entirely; perfectly. FULL'NESS, n. state of being filled so as to leave no part vacant; completeness; plenty; extent; loudness. FULL-AGED, of mature age. FULL-BLOWN, fully expanded, as a blossom. FULL-BODIED, having a large body; having standard strength and flavor. FULL-BOTTOMED, having a large bottom, as a wig. FULL-BUTT, with strong force or violence. FULL-CRY, said of the hounds that, having caught scent of the fox, cry or bark in concert. FULL-DRESS, n. the dress which custom or etiquette prescribes for any occasion of ceremony, social or public: ADJ. having all the necessary parts of attire for the occasion. FULL-DRESSED, dressed in proper form or costume, as for a ball or concert. FULL-DRIVE, with full speed. FULL-EYED, prominent. FULL-FACED, having a broad fat face; presenting the whole face as a portrait. FULL HABIT OF BODY, stout and fat. FULL-HEARTED, courageous. FULL-LENGTH, extending the whole length; embracing the whole. AT THE FULL, fully brought out or expanded, as the moon.—SYN. of 'fully': largely; copiously; plentifully; maturely; plenteously; abundantly; sufficiently; amply; clearly; distinctly; adequately; satisfactorily.

FULL, v. *fûl* [OF. *fouller*, to full or thicken cloth in a mill: F. *fouler*, to tread or trample on—from mid. L. *fullārĕ*, to cleanse clothes—from L. *fullo*, a dresser of cloth: It. *follare*, to full cloths]: to scour or cleanse; to make compact, or to thicken in a mill; in *OE.*, to whiten cloth; to bleach. FUL'LING, imp.: N. the art of thickening and scouring cloth in a mill. FULLED, pp. *fûld:* ADJ. cleansed; thickened. FULLER, n. one whose business is fulling; in *OE.*, a bleacher; one who cleanses clothes. FULLER'S EARTH (q.v.) FULLER'S THISTLE, the plant teasel, whose burs are used in dressing cloth.

FULL: the term signifies that a dimension is slightly larger than it ought to be, but only so slightly that the excess may be measured only by calipers rather than by rule measurement. When applied to an eccentric, it re-

fers to that part of the sheave which is situated at the greatest distance from the crankshaft upon which it is fixed.

FULLAM. See FULHAM.

FULLER, *fûl'er*, ANDREW: English Baptist minister, and theological and controversial writer: 1754, Feb. 6—1815, May 7; b. Wicken, Cambridgeshire; son of a small farmer. He received the rudiments of education at the free school of Soham, and in youth was busied in agricultural labors. In his 17th year, he became a member of a Baptist church at Soham, and 1775 was chosen pastor of a congregation at that place. His small stipend of £21 per annum he endeavored to increase by keeping, first a small shop, and then a school. In 1782, he became pastor at Kettering, Northamptonshire. On the formation, 1792, of the Baptist Missionary Soc. by Dr. Carey, himself, and 11 other ministers, he was appointed its sec., and thereafter was devoted to the administration of its affairs. In 1794 he published a controversial treatise, entitled *The Calvinistic and Socinian Systems, examined and compared as to their Moral Tendency* (Lond. 8vo.). This work was attacked by Dr. Toulmin and Mr. Kentish; and Fuller replied in a pamphlet, entitled *Socinianism Indefensible* (Lond. 1797, 8vo). His other principal publications are *The Gospel its own Witness* (Clipstone, 1797) and *Expository Discourse on the Book of Genesis* (2 vols., 8vo, Lond., 1806). He was author of a variety of single sermons and pamphlets. The sense, sagacity, and thoroughly practical knowledge of mankind which these writings display, have won for Fuller the title of 'the Franklin of Theology.' Three collected editions of his works have been published, besides American reprints; the first in 10 vols. 8vo, the second in 5, and the third in 1 royal 8vo. A vol. of his treatises was republished in Bohn's Standard Library, with a Memoir by his son. Fuller's *Memoir of the Rev. Samuel Pearce of Birmingham* is much esteemed as a religious biography.

FULLER, ANNA, American novelist: b. Cambridge, Mass., 1853, Nov. 9. Her works are: *Pratt Portraits; Sketched in a New England Suburb* (1892); *A Literary Courtship* (1893); *Peak and Prairie* (1894); *A Venetian June* (1896); *One of the Pilgrims* (1898); *Katherine Day* (1901); *A Bookful of Girls* (1904).

FULLER, ARTHUR BUCKMINSTER, American Unitarian clergyman: b. Cambridgeport, Mass., 1822; d. at the battle of Fredericksburg, Va., 1862, Dec. 13. He was graduated from Harvard in 1843, studied in the Harvard Divinity School, and held pastorates in Manchester, N. H., and Boston and Watertown, Mass. In the Civil War he was chaplain to a Massachusetts regiment. He edited several works of his sister, Sarah Margaret Fuller d'Ossoli.

FULLER, GEORGE, American artist: b. Deerfield, Mass., 1822; d. Boston, 1884, March 21. As early as

1857 his work attracted attention, and during the last years of his life his pictures were warmly admired by many for their richness of tone and peculiar handling, though they never appealed to the popular taste. His best-known works are: *The Romany Girl* (1879); *She was a Witch* (1879); *Winifred Dysart* (1881); *A Turkey Pasture in Kentucky; Fedalma* (1884).

FULLER, Henry Blake, American author: b. Chicago, Ill., 1857, Jan. 9. He was intended for a mercantile career, but entered literature with *The Chevalier of Pensieri-Vani* (1891), and *The Chatelaine of La Trinité* (1892). He next wrote: *The Cliff Dwellers* (1893), and *With the Procession* (1895), novels of Chicago life; *The Puppet-Booth* (1896), dramatic sketches; *From the Other Side* (1898), short stories; *The Last Refuge* (1900); *Under the Skylights.*

FULLER, John Wallace: soldier: b. Cambridge, England, 1827, July 28; d. 1891, Mar. 12. He removed to the United States 1833; was a bookseller in Utica, N. Y., and Toledo, Ohio; was treas. of Utica 1852-54; became asst.adj.gen. of Ohio 1861, May, and col. of the 27th Ohio vols. Aug.; promoted brig-gen. 1864, brevetted maj.gen. 1865, Mar. 13, and resigned Aug. 15. During his military career he commanded the Ohio brigade at Iuka and Corinth, captured Decatur, Ala., commanded a brigade in Sherman's Atlanta campaign, and opened the battle of Atlanta, and commanded the 1st div. 17th corps on the march to the sea. He was afterward collector of the port of Toledo.

FULLER, Melville Weston: lawyer: b. Augusta, Me., 1833, Feb. 11. He graduated at Bowdoin College 1853, studied law in Bangor and in the law dept. of Harvard Univ., and was admitted to the bar and began practicing in Augusta 1855, in the following year he became pres. of the common council and city solicitor of Augusta, but resigned both offices and removed to Chicago. He took an active part in the presidential campaign of 1856, supporting the democratic candidate. In 1860 he delivered the address welcoming Stephen A. Douglas to Michigan City, 1861 was chosen delegate to the Ill. constitutional convention where he rendered good service, 1862 was elected member of the legislature from the 61st dist., usually a republican stronghold, and 1864, 72, 76, 80 was a delegate to the democratic national convention. Aside from these offices he has applied himself closely to his profession in which he has been eminently successful and in which he has never been connected with a criminal case. He was nominated by President Cleveland to succeed the late Morrison R. Waite as chief justice of the U. S. supreme court, 1888, Apr. 30, was confirmed by the senate July 20 by a vote of 40 to 21, and took his seat Oct. 8.

FULLER, Sarah Margaret, Marchioness Ossoli: 1810, May 23—1850, July 16; b. Cambridgeport, Mass.;

dau. of Timothy Fuller, an advocate, who gave his daughter an excellent education, and nurtured her with great care. At eight years of age she wrote Latin verses: and philosophy, history, and æsthetics were her favorite studies. At ten she read Tasso and Ariosto in the original, and subsequently made herself familiar with the German writers, Tieck, Schelling, and Novalis. After her father's death she assisted her family by private teaching, and 1839 she founded a society for ladies, where she delivered lectures. 1839-44, she edited *The Dial*, contributing many admirable articles. Invited by Horace Greeley, editor of the *Tribune*, she went to New York 1844, and contributed to that journal a series of articles on literature and art, since published under the title *Papers on Literature and Art* (London 1846). In 1850, she published *Woman in the Nineteenth Century*, in which she discussed the nature and destiny of woman, and claimed for the sex rights long denied. In 1846, she went to England, where she made the acquaintance of Carlyle, for whom she had long had high esteem. At Paris she gained the friendship of Madame Dudevant, better known by her pseudonym of *Georges Sand*. In Rome she met the Marquis d'Ossoli, to whom she was married 1847, Dec. She took an active share in the political questions that agitated those times. In 1849, during the siege of Rome, she took charge of a hospital; and saw with pain the downfall of the new and ephemeral Roman Republic. In 1850, on her return voyage to America accompanied by her husband and newly born infant, the ship, which had almost reached New York, was wrecked in a hurricane and the three perished in the waves. Her memoirs were published by Emerson and Channing (1852). See also the shorter life by Julia W. Howe (1883).

FULLER, Thomas, D.D.: English historian and divine: 1608-1661, Aug. 16; b. Aldwinkle, Northamptonshire, of which parish his father was rector. He was educated at Queen's College, Cambridge, and took the degree A.B. 1624, and A.M. 1628. He stood so high in his college that, before he was 23 years of age, he was appointed to St. Benets, Cambridge, and acquired great popularity as a preacher. Soon afterward he was collated to a prebend in Salisbury Cathedral, and obtained a fellowship in Sidney Sussex College. His first publication was a poem, entitled *David's Heinous Sin, Hearty Repentance, and Heavy Punishments* (1631, 8vo). He became rector of Broad Windsor, Dorsetshire; published his *History of the Holy War*, Cambridge 1639; and 1640 removed to London, where he was chosen lecturer at the Savoy Church in the Strand. The same year he was a member of the Convocation at Westminster, and one of the select committee appointed to draw up new canons for the better government of the church. During the civil war adhered firmly to the royal cause; and shared in its reverses. In 1646, however, he was chosen lecturer, first, at St. Clement's Lane, Lombard Street, and afterward at St. Bride's. About 1648,

he was presented to the living of Waltham, Essex. In 1650, he published a geographical account of the Holy Land, entitled *A Pisgah Sight of Palestine and the Confines thereof* (folio, with maps and views), and *Abel Redivivus*, a collection of lives of modern divines; 1655, he published at London *The Church History of Britain, from the Birth of Jesus Christ until the year* 1648 (folio). In 1658, he received the living of Cranford, Middlesex, and at the Restoration he was reinstated in his prebend of Salisbury, of which he had been deprived by the Parliamentarians. He was also appointed chaplain extraordinary to the king, and created D.D. at Cambridge by royal mandamus. His principal work was *The Worthies of England*, London 1662 (folio). Valuable for information on provincial history, it abounds in biographical anecdote, witty remark, and acute observation on men and manners. A new ed. with his life appeared 1810 (2 vols. 4to). His *Holy and Profane States* were republished in the U. S. 1831. Quaint humor is one of Fuller's peculiar characteristics; but his writings are no less remarkable for wisdom, imagination, and, when occasion demands, even for pathos. 'Next to Shakspeare,' says Coleridge, 'I am not certain whether Thomas Fuller, beyond all other writers, does not excite in me the sense and emulation of the marvellous. . . . . He was incomparably the most sensible, the least prejudiced great man, in an age that boasted of a galaxy of great men.'

FULLERING: a mode of caulking boiler plates. It differs from caulking proper in that the entire edge of the plate is hammered over instead of only a portion of the edge.

FUL'LER'S EARTH: mineral consisting chiefly of silica, alumina, and water, with a little magnesia, lime, and peroxide of iron. It occurs in beds, associated with chalk, oolite, etc.; is usually of a greenish-brown or a slate-blue color, sometimes white; has an uneven earthy fracture, and a dull appearance; its specific gravity is from 1.8 to 2.2; it is soft enough to yield readily to the nail; is very greasy to the touch; scarcely adheres to the tongue; falls to pieces in water, but does not become plastic. It has a remarkable power of absorbing oil or grease; and was formerly much used for filling cloth, but is now more generally employed as a filtering material for the clarification of oils. In the U. S. it is found chiefly in Florida, also in Georgia, Arkansas and other states in smaller quantities. In England it is found at Nutfield (Surrey), at Bath, and elsewhere. At Bath the group of associated clays and marl has been called the 'Fuller's Earth Series.'

FULLS. See under MATTIES.

FULMAR, n. *fŭl'mâr* [Icel. *fúlmár*], or FUL'MAR PET'REL (*Procellaria* or *Fulmarus*): genus of birds generally referred to the gull family (*Laridæ*), and containing some of the most strictly oceanic birds: see PETREL.

The bill is not longer than the head—large, strong, and subcylindrical, the upper mandible suddenly hooked at the point; the lower mandible with the tip curved upward; the tips of both mandibles appearing as separate pieces firmly joined to the straight part of the bill, which is marked by longitudinal grooves; the nostrils inclosed in a tube open at the extremity, and extending along the ridge of the upper mandible. The tarsi are compressed; the hind-toe rudimentary, a mere claw. The tail is short, and slightly rounded; the wings are long—The COMMON or NORTHERN FULMAR (*P.* or *F. glacialis*) is a bird about the size of a duck, gray above, white beneath, the head and neck pure white, the tail white, the bill yellow, the young brownish gray. It inhabits the most northern seas, in which its numbers are prodigious; breeds on the rocky shores of the Faröe Islands, Iceland, Greenland, Spitzbergen, etc., on the grassy shelves of the precipices, making a slight nest or a mere excavation, in which it lays one egg. It is rarely seen on the coast of Britain, but more frequently in Orkney and Shetland, where it does not often breed, though it breeds in great numbers in St. Kilda and the adjacent islets of Borrera and Soa. It is of importance to the inhabitants of St. Kilda, who esteem its eggs and flesh above those of any other bird, and seek them in the most perilous manner, descending by ropes from the summit of the precipices. The fulmars are valued also for their feathers and down, and for their oil which is one of the principal products of St. Kilda, and is obtained from their stomachs. The old are said to feed the young with it; and when they are caught or assailed, generally lighten themselves by disgorging it. It is amber-colored, and has a peculiar and very disagreeable odor. Fulmars feed on all animal substances which come in their way, preferring fat, and delighting in the blubber of whales. They pursue whales to prey on the cirrhopods which are attached to them or imbedded in their skin. Multitudes of the birds soon gather around a dead whale, and they are so bold as to advance within a few yards of the men who are cutting it up. When food is abundant, they often glut themselves until they are unable to fly. They follow the greasy track of a whaler; indeed, some of them are always in attendance on ships immediately after they pass n. of the Shetland Islands, ready to seize any garbage that may be thrown overboard. Sailor-boys often amuse themselves in catching them by means of lines and hooks baited with fat.

Another species of Fulmar (*P.* or *F. Pacifica*) exists in the Pacific Ocean, and the MOTHER CAREY'S GOOSE or CHICKEN of sailors, a large bird of the southern seas, is sometimes referred to the same genus.

FULMINATE, v. *fŭl'mĭ-nāt* [L. *fulmĭnātus*, thundered, struck or blasted with lightning—from *fulmen*, thunderbolt, lightning: It. *fulminare:* F. *fulminer*]: to make a loud sudden noise; to cause to explode; to utter or send out a denunciation of censure: N. a substance

which explodes by percussion, rubbing, or heat; a salt of fulminic acid. FUL'MINATING, imp.: ADJ. thundering; exploding with a crack and flash. FUL'MINATED, pp. FUL'MINA'TION, n. *-nā'shŭn* [F.—L.]: the utterance of threats or censure; explosion of certain chemical preparations. FUL'MINA'TORY, a. *-nā'ter-ĭ*, thundering; striking terror. FULMIN'IC ACID, a. *-mĭn'ĭk*, an acid related to cyanic acid. It has never been isolated in the hydrated form, but from the composition of its salts, its formula doubtless is $C(NO_2)H_2{\cdot}CN$: it is thus isomeric with cyanic acid. Fulminic acid may be separated from the oxide of mercury and silver, and combined with other bases, such as potash; and all such compounds are explosive. FULMINE, v. *fŭl'mĭn*, in *OE.*, to dart like lightning; to thunder; to speak with irresistible power. FULMINUR'ATES, n. *-ūr'āts*, salts of fulminuric acid, $C_2H_2N_3O_3$.

FULMINATES: compounds of fulminic acid, all of which are violently explosive. The most important of these is mercuric fulminate, which is formed by dissolving 10 parts by weight of mercury in 120 parts of nitric acid (specific gravity 1.4) and, when cooled, pouring this solution into 110 parts of 95 per cent. grain alcohol. At the normal temperature a reaction sets in which becomes quite turbulent, dense white fumes being given off and then red fumes, and after this, the mercuric fulminate separates out as a gray, crystalline powder. It has the formula of $HgO_2N_2C_2$, and belongs to the class of chemical substances known as oximes. Its specific gravity is 4.42. When dry, mercuric fulminate explodes violently if struck or compressed or rubbed between hard surfaces, when heated to 186° C., when touched with strong sulphuric or nitric acids, or when in contact with sparks from flint and steel or electric sparks. In all these cases the body undergoes a detonating explosion, and its principal use is to produce detonation in high explosives, though it is also used in percussion caps and primers to ignite gunpowder and other low explosives. Mercuric fulminate should be stored and transported only in the moist condition, yet even in this condition it can be exploded by the explosion of dry fulminate in contact with it. Certain amines like fulminating silver, gold, mercury and copper are frequently confounded with the fulminates because they are also explosive. The best known of these is fulminating silver, which is made by treating freshly precipitated silver oxide with ammonia water. It separates out as a black, crystalline mass, which explodes on the slightest concussion when dry and may even be exploded by rubbing when moist, so that it requires the greatest caution in handling.

FULSOME, a. *fŭl'sŭm* [perhaps AS. *ful*, foul; Eng. *some*, full of]: *literally*, fulfilling or satisfying; distasteful; disgustingly fawning or obsequious; nauseous; cloying, rank and gross, as a *fulsome* speech; in *OE.*, abun-

dant. FUL'SOMELY, ad. *-li.* FUL'SOMENESS, n. offensive grossness.

FULTON, Ill.: city in Whiteside co., on the Mississippi River, and on the Chicago, M. & St. P., the Chicago, B. & N. and the Chicago & N. W. R.R.'s; 36 miles northeast of Rock Island. The Northwestern College of Illinois was opened here in 1865, and other prominent educational institutions are located in this vicinity. There are extensive lumber manufactories, clay-mills, sewer-pipe works, stove and metal foundries, and there is a large trade here in grain, lumber, and produce. The municipality is governed by a mayor and council elected every two years by popular vote. Pop. 3,000.

FULTON, Mo.: city and county-seat of Callaway co., on the Chicago & A. R.R., 125 m. w. of St. Louis. Here are located the State Institution for the Deaf and Dumb, State Lunatic Asylum No. 1, Westminster College (Presb.), founded 1852; the Woods College of the Christian Church of Missouri, and the Synodical College and Conservatory of Music. Fulton is noted for its fire-brick and pottery works, the city having an extensive supply of coal and fire-clay. The town was settled in 1821, and was incorporated as a city in 1859. The charter has never been changed since that date. The mayor and council are elected annually. The city owns and operates its electric light and water plants. Pop. (1900) 4,883; (1910) 5,228.

FULTON, N. Y.: city in Oswego co., on the Oswego River and the Oswego Canal, and on the New York C., New York, O. & W., and Delaware & L. R.R.'s, 25 miles northwest of Syracuse. It has a public library, city hall, opera house and other public buildings. It is the centre of the cheese trade of northern New York, and there are manufactures here of paper, woolen goods, flour, fire-arms, tools, water-motors, cutlery, paper-mill machinery, condensed milk, canned goods, etc. Fulton was settled in 1791 and was originally incorporated as a village in 1835. The villages of Fulton and Oswego Falls, with an aggregate population of 8,206, were consolidated and chartered as a city in 1902 April. A mayor and common council govern the city, being elected every two years by popular vote. Pop. (1910) 10,480.

FULTON, JUSTIN DEWEY, D. D.: Baptist preacher: b. Earlville, N. Y., 1828, Mar. 1,; d. 1901, April 16. He graduated at the Univ. of Rochester 1851, studied in the Rochester Theol. Seminary, and was ordained pastor of a Bapt. Church, St. Louis, 1853. He preached in Sandusky, O., 1855-59, Albany 1859-63, building the Tabernacle Bapt. Church in the meantime, 1863-73 in Tremont Temple, Boston, and 1873-87 in Brooklyn. In the latter year he resigned his pastorate for the purpose of applying himself to the conversion of Rom.

Catholics to Protestantism. He was a popular lecturer and sharp controversialist, and published *The Roman Catholic Element in American History* (1859); *Life of Timothy Gilbert* (1864); *Woman as God Made Her* (1867); *The Way Out* (1870); *Show Your Colors* (1881); and *Rome in America* (1884). He received the degree of D.D. from the Univ. of Rochester 1871.

FULTON, *fûl'ton*, ROBERT: 1765-1815; b. Little Britain, Penn.: engineer. His parents had emigrated from Ireland, and were in poor circumstances, so that all the education given to young Fulton was the ability to read and write; but he used what he had and passed in study the time allowed for recreation. When he was old enough, his mother apprenticed him to a jeweller in Philadelphia. In addition to his labors at this trade, he applied himself to painting; and the sale of his portraits and landscapes enabled him in four years to purchase a small farm, on which he placaed his mother, his father being dead. At the age of 22, he went to London, where he studied painting under West; but after several years he felt that this was not his true vocation, and turned wholly to mechanics. Some works that he performed in Devonshire obtained him the patronage of the Duke of Bridgewater, likewise of the Earl of Stanhope. In 1794, he obtained from the British govt. a patent for an inclined plane, the object of which was to set aside the use of locks in canals; and in the same year, he invented a mill for sawing and polishing marble. His next invention was a machine for spinning flax, followed by one for making ropes. He was received as a civil engineer 1795; and wrote a work on canals, in which he developed his system. On invitation from the U. S. minister at Paris, he went to that city 1796, and remained there seven years, busied in new projects and inventions. Among his inventions here was the *nautilus* or submarine boat, for naval warfare, which he in vain submitted for adoption to the French and British govt. He next turned to a subject that had frequently occupied his mind, and about which he had written a treatise 1793—viz., the application of steam to navigation. In 1803, he constructed a small steamboat, and his experiments with it on the Seine were successful; but disgusted with the reception of his enterprise, he returned 1806 to New York and pursued his experiments there. He perfected his *Torpedo* (q. v.) system, afterward employed effectively in the war between the United States and Britain. In 1807, he launched a steam-vessel on the Hudson, which made a successful start, in the presence of thousands of astonished spectators. Beginning with this period, steamers (for the construction of which Fulton received a patent from the legislature) came into use upon the rivers of the United States. Though Fulton was not the first to apply steam to navigation—as a steam-vessel had been tried upon the Forth and Clyde

Canal as early as 1789, and John Fitch (q.v.) had launched a steam-packet on the Delaware 1787—yet he was the first to apply it with any degree of success (see STEAM-NAVIGATION). Fulton's reputation was now established, and he was employed by the U. S. govt. in the execution of various projects with reference to canals and other works. In 1814, he obtained the assent of the legislature to construct a steam-frigate, which was launched in the following year. Though his labors had such great success, various lawsuits in reference to the use of some of his patents, prevented him from ever becoming wealthy; and anxiety, as well as excessive application, tended to shorten his days. His death produced extraordinary demonstrations of mourning throughout the country. Fulton married, 1806, a niece of Robert Livingston, U. S. minister to France.

FULVOUS, a. *fŭl'vŭs* [L. *fulvus*, of a deep yellow]: yellow; tawny; of a saffron color.

FULWA, n. *fôl'wâ* [Nepaulese, *phulwara*, name of the tree]: a solid buttery oil obtained from *Bassia butyracea*.

FUM, *fŭm* (properly, FUNG, *fŭng*, the first being the Portuguese pronunciation): the Chinese Phœnix—one of the four mystical and symbolical animals supposed to preside over the destinies of the Chinese empire. Its appearance is declared to indicate an age of universal virtue, the influence of which has extended throughout creation. It is supposed to originate from the element of fire, and to be born in the Tan-heuĕ, or Hill of the Fiery Halo of the Sun; to have the forepart of a goose, hindquarters of a stag, neck of a snake, fish's tail, fowl's forehead, down of a duck, dragon's marks, the back of a tortoise, face of a swallow, and beak of a cock, with beak, claws, and feathers of various colors, red crest, and golden beak. It is about six cubits high, and comes from the East. In mystical language, it is called the Leĭh-kwan, or 'mandarin of time,' and is said to have a forehead like heaven, eyes like the sun, back like the moon, wings like the wind, feet like earth, and a tail like the planets. On its body are inscribed the five cardinal virtues. According to some authors, it perches only on the woo tung tree, and eats the seed of the bamboo; others describe it as swallowing small carp. Other accounts say it eats no living insect, and treads on no growing plant. Its voice is said to be like a flute, drum, or even thunder. When seen, it is followed by birds. According to Chinese history, it has occasionally appeared; and a celebrated female flute-player, named Lung-yu, is said to have enticed it from heaven with her music, and then fled away with it. Like the phœnix of the Egyptians and roc of the Arabs, the myth may have had a historical origin, subsequently disfigured by fiction. It is often represented on Chinese works of art, under the form of a gallinaceous bird, and is embroidered

on the dresses of mandarins of a certain rank. It is mentioned by some modern English poets.—Kidd, *History of China*, p. 267; Ching-tsze-tung, 172 sect.; Yuen-keen-luy-han, 148 sect.

FUMARIA, n. plu. *fū-mā′rĭ-ă* [L. *fūmus*, smoke]: a genus of plants with small flowers, ord. *Fūmdrĭācĕæ;* the fumitory (q. v.).—FUMARIACEAE, nat. ord. of exogenous plants; herbaceous, with a watery juice; their leaves alternate much divided; the calyx of two deciduous sepals; the corolla of four very irregular petals; the stamens sometimes four and distinct, usually six and in two bundles; the ovary free, one-celled, one-seeded, or many-seeded; the seeds having large albumen. The F. are regarded as in their botanical characters approaching most nearly to the *Papaveraceæ* (Poppy, etc.); but their general aspect is very different, and they have not the same powerful properties. Both the foliage and flowers of some have considerable beauty. *Dielytra spectabilis* is a well-known favorite in gardens and greenhouses. More than 100 species are known, natives mostly of temperate climates in the n. hemisphere. The COMMON FUMITORY (*Fumaria officinalis*), frequent weed in gardens and cornfields, is of rather delicate and beautiful appearance. It is annual, and easy of extirpation, where it springs up in excess. It was formerly much used in medicine, having high reputation as a tonic and diaphoretic: though disused in Britain, it is still esteemed in France as a remedy in scorbutic affections, chronic eruptions, etc. Some other species of fumitory have similar properties. The leaves have an intensely bitter saline taste. See FUMITORY.

FUMAR′IC ACID, or BOLETIC ACID ($C_4H_4O_2$): crystalline acid substance, procured from Fumaria and many other plants. It was obtained first by Braconnot from a species of boletus, and has since been found in many other fungi, in numerous lichens, in various species of Fumaria, in Corydalis bulbosa, etc. It may be obtained also in association with malæic acid, by heating Malic Acid (q.v.) to 350° F.—It crystallizes in prisms, which have a very acid taste, are only slightly soluble in water, but dissolve readily in alcohol and ether. At a temperature of 392° F., it volatilizes without fusing, and is converted into the malæic acid above mentioned, which has the same composition as fumaric acid, but different properties. If malæic acid be exposed for a long time to a temperature of 266°, it again passes into fumaric acid, so that these acids are mutually convertible. Kekulé has shown (*Annalen d. Cyemie*, 1861) that both fumeric acid and malæic acid combine directly with bromine, and produce crystals of dibromo succinic acid; and further, that if fumaric acid be dissolved in water, and digested with an amalgam of sodium, the nascent hydrogen from the decomposed water combines with the acid, and converts it into succinic acid. Its compounds are of

no special interest. FUMERATES, n. *-āts*, salts of fumaric acid.

FUMBLE, v. *fŭm'bl* [Low Ger. *fummelen*, to fumble: Dan. *famle*, to stammer: Icel, *falma*, to grope about]: to feel or grope about; to handle awkwardly; to handle much. FUM'BLING, imp.: ADJ. groping; managing awkwardly; to stutter or utter awkwardly. FUMBLED, pp. *fŭm'bld*. FUM'BLINGLY, ad. *-lĭ*. FUM'BLER, n. *-bler*, one who gropes or manages awkwardly.

FUME, n. *fūm* [OF. *fum*, smoke—from L. *fūmŭs*, smoke: Skr. *dhûma*, smoke—from *dhû*, to agitate: It. *fumo;* F. *fumée*]: vapor from combustion; smoke or vapor; any volatile or gaseous matter emitted in an offensive form; rage; passion: V. to yield vapor; to be in a rage; to chafe with anger. FU'MING, imp.: ADJ. sending forth vapor; raging. FUMED, pp. *fūmd*. FU'MINGLY, ad. *-lĭ*. FUME'LESS, a. free from fumes. FU'MILY, ad. *-mĭ-lĭ*. FU'MINESS, n. FUMY, a. *fū'mĭ*, producing smoke or vapor; full of vapor. IN A FUME, in a state of ill-temper; particularly from impatience. FUMIFEROUS, a *fū-mĭf'er-ŭs* [L. *fĕrō*, I bear]: producing fumes or smoke. FUMAROLE, n. *fū'mă-rōl* [It. *fumare*, to smoke]: an opening in a volcanic district from which smoke and gaseous fumes issue forth.

FUMET, n. *fū'mĕt* [F. *fumier*, dung—from L. *fĭmus*, dung]: the dung of deer. FUMETTE, n. *fū-mĕt'* [F.]: high flavor, as of long-kept game.

FUMIGATE, v. *fū'mĭ-gāt* (L. *fūmĭgātus*, smoked, fumigated—from *fūmŭs*, smoke]: to smoke anything; to perfume; to expose to the action of disinfecting vapors. FU'MIGATING, imp. FU'MIGATED, pp. FU'MIGA'TION, n. *-gā'shŭn* [F.—L.]: use of fumes or vapors to purify or disinfect the air, and especially for counteracting contagious poisons in clothing, furniture, etc. (see CONTAGION: INFECTION). Few of the common methods have any value: for the really active processes, see DISINFECTANTS. FU'MIGATOR, n. *-gā-tēr*, an instrument for fumigating. FU'MIGA'TORY, a. *-gā'ter-ĭ*, that purifies by fumes or vapors.

FUMITORY, n. *fū'mĭ-ter-ĭ* [F. *fume-terre*, the fumitory—from L. *fūmŭs*, smoke; *terra*, earth—alluding to the disagreeable smell of the plant]: wild plant, with divided leaves, and spikes of little purple flowers; the genus of plants *Fumărĭă*, ord. *Fūmarĭācĕæ* (see FUMARIA). *Note.—Literally*, F. *fume de terre*, smoke of the earth.

FUN, n. *fŭn* [prov. F. *fun*, smoke: Sw. *fiun*, anything light as vapor: Icel, *fana*, to behave foolishly: Sw. *fane;* AS. *fon*, a fool]: sport; game; merriment; drollery. FUN'NING, n. the act of making fun; the act of making a fool of, or making game of. FUN'NY, a. *-nĭ*, droll; comical. FUN'NILY, ad. *-lĭ*.

FUNAMBULATE, v. *fū-năm'bū-lāt* [Sp. *funambulo*, a walker on a rope—from L. *fūnis*, a rope; *ambŭlō*, I

walk]: to walk or dance on a rope. FUNAM'BULIST, n. *-lĭst*, a rope walker or dancer.

FUNARIA, *fū-nā'rĭ-a:* genus of mosses with terminal fruit stalks, and oblique double peristome, both the inner and outer having 16 teeth. One species, *F. hygrometrica*, is of interest for the hygrometric properties of its fruit-stalk, which, if moistened in the lower part, twists several times round in one direction; and if moistened in the upper part, twists several times round in the opposite direction. This is owing to a perculiar arrangement of the cellular tissue, which is spiral in one direction at the base of the stalk, then straight, then spiral in the opposite direction. *F. hygrometrica* has very concave, ovate, entire, apiculate leaves. It is very common on old buildings and on dry barren soils; and is said to be almost always found where a wood-fire has been burning on the ground, as on the site of gipsies' encampments, etc.

FUNARIACEÆ, n. *fū-nār-ĭ-ā'sē-ē:* family of *Funaroideæ*, sub-ord. of operculated acrocarpous mosses.

FUNCHAL, *fôn-shâl':* capital and only town of the island of Madeira (q. v.); on the s. side of the island, consisting chiefly of one street, extending about a mile along the shore, with numerous streets and lanes at right angles with the main street, and leading up the hill which backs the town. The roadstead is open, and its anchorage rocky and uneven. F. has a cathedral, numerous churches, and small convents, and is defended by four forts. From it all the produce of the island is exported. Pop. about 20,000.

FUNCTION, n. *fŭngk'shŭn* [F. *fonction*—from L. *functĭōnem*, a performance, an execution—from *functus*, performed: It. *funzione*]: performance; office; employment; duty belonging to any particular office or station, as functions of royalty; the office of any bodily organ; power; faculty; in *arith.*, the result of certain arrangements of numbers; any number considered as formed from any other number. FUNC'TIONAL, a. *-ăl*, pertaining to, or connected with functions. FUNC'TIONALLY, ad. *-lĭ*. FUNC'TIONARY, n. *-ēr-ĭ*, one who holds an office; an official. FUNCTIONAL DISEASE, in *med.*, the derangement of an organ arising from a cause external to itself, as when indigestion causes functional derangement of the heart, brain, etc.; opposed to *organic disease*, in which the organ itself is affected; a phrase that merely expresses ignorance of the cause and nature of the disease.

FUNCTION, in mathematics: a quantity which depends for its value on another quantity or quantities. Thus the area of a circle is a function of the radius; the volume of a rectangular solid is a function of its length, breadth, and thickness; the volume of a given weight of a gas is a function of the pressure and the temperature; the height of the tide at a given place on the shore is a

function of many elements. In the great mass of cases we are not in position to express the functional relation in analytic form, although a large number of analytic functions are at our present disposal. Thus $x^2\sqrt{1-x}$, $\sin x, e^x, \log(ax+b)$ are functions of x; $x^2+y^2, \tan(ax+by)$, x^y are functions of x and y; xyz, e^{x+y+z}, $ax+by+cz$ are functions of x, y, and z; etc. The quantities x, y, z, . . . on which a function depends are called the *variables*, since they are generally supposed to range through a series of values which is accompanied by corresponding changes in the value of the function. The expression for the function often also contains *constants*, either numerical, or algebraic as a, b, . . . When a function is actually written out, as in the example above, it is called an *explicit* function. But functions are often defined by an equation or set of equations from which they are to be obtained by solution; they are then called *implicit* functions. Thus the equation $x^2+y^2=a^2$ defines y as an implicit function of x, its explicit value being $y=\sqrt{a^2-x^2}$. Functions are again divided into *algebraic* and *transcendental*. Algebraic functions require for their expression only the operations of addition, subtraction, multiplication, division, raising to powers and extraction of roots. All other functions are called transcendental. Among the latter are included the trigonometric functions, as $\sin x$, $\cos x$, etc., the exponential and the logarithmic functions, and their combinations. The algebraic functions include the *rational*, which do not involve roots; and these are divided into *integral* (polynomials) and *fractional*. When a given functional expression is to be used repeatedly, it is commonly denoted by a single letter f, F, $\varphi, \psi, \ldots$, followed by the variables. Thus $F(x)$, or $F(x,y)$ denotes one particular expression throughout an entire investigation. If for example $F(x,y)=x^2+y^2$, then $F(0,1)=0^2+1^2=1$, $F(2,3)=2^2+3^2=13$, $F(a,b)=a^2+b^2$, etc.

A very important classification of functions relates to the matter of *continuity*. A function is continuous when on changing the values of the variables the resulting change in the value of the function approaches 0 as the new values of the variables are made to approach the old ones. Otherwise the function is discontinuous. The functions of ordinary analysis are usually continuous except for special values of the variables. Thus $\frac{1}{1-x}$ is a continuous function except at $x=1$, where it becomes infinite. The Calculus determines the rates of change (derivatives) of functions with respect to their variables. The derivative of $f(x)$ is denoted by $f'(x)$, its derivative by $f''(x)$, etc. Only a continuous function can have a derivative, and not all continuous functions have one. Modern analysis is able to deal with large classes of discontinuous functions; these are often expressible by means of Fourier series. (See SERIES).

The trigonometric and exponential functions possess the property of *periodicity*, i.e., they repeat their values

as the variables increase by a certain *period.* Thus sin $(x+2\pi)=\sin x$, $e^{x+2\pi i}=e^x$, the periods here being 2π or 360° and $2\pi i(i=\sqrt{-1})$. The elliptic functions have two independent periods, one of which is always imaginary. Higher functions of analysis may have three or more periods. But a function which takes only one value for each value of the variable has at most two periods. Certain functions are periodic in a different sense. Thus if the equation $x'=\frac{1}{1-x}$ be regarded as defining an operation which performed on x produces x', and if this operation be repeated, giving $x''=\frac{1}{1-x'}$, $x'''=\frac{1}{1-x''}$, it will be found that $x'''=x$. Thus the functional operator $\frac{1}{1-x}$ is said to be of period 3.

In the past hundred years the Theory of Functions has grown into an extensive science, largely through the introduction of complex numbers (q.v.). This science deals with the various types of functions considered with reference to continuity, differentiation and integration, periodicity, etc. The rational functions are treated in the theory of equations. Many of their properties are discussed in analytic geometry and the theory of invariants. The *linear* functions (those of the first degree) define geometric *projection.* See CALCULUS: EQUATIONS: GEOMETRY: etc.

FUNCTUS OFFICIO, *fŭngk'tŭs ŏf-fĭ'shĭ-ō* [Lat. 'having discharged a duty']: legal term applied to a person who has completed or fulfilled an obligation laid upon him; a warrant of attorney on which a judgment has been entered; a bill of exchange sent to the drawee and credited by him to the holder; or a warrant on which a person has been arrested.

FUND, n. *fŭnd* [OF. *fond,* a bottom, a floor—from L. *fundus,* a farm, an estate: It. *fondo;* F. *fonds,* funds, stock]: that out of which supplies are drawn; a stock or bank of money; ample store; permanent debts due by government paying interest are called the *funds* or *stocks:* V. to place money in a fund; to put lent money into the form of permanent bonds or stock bearing regular interest. FUND'ING, imp. a. putting into the funds; placing in the condition of a funded debt; arranging to hold money borrowed for public purposes, as a perpetual loan at a certain interest; thus obligations are from time to time said to be converted from floating into funded debts. FUND'ED, pp. a. placed in the funds or public stocks as a permanent investment; put into the form of bonds or stock. FUND'LESS, a. FUND-HOLDER, one having money invested in *the funds.* FUNDING SYSTEM, the governmental plan and method of transferring temporary into permanent obligations; the organization for buying and selling the right to become a public creditor and to receive a share of the interest on the national debt. See DEBT, NATIONAL.

FUNDAMENT, n. *fŭn'dă-mĕnt* [L. *fundamentum*, groundwork, basis: It. *fondamento:* F. *fondement*]: the foundation; the seat of the body. FUN'DAMEN'TAL, a. pertaining to or serving for the foundation; essential, primary; leading: N. a leading or primary principle or article; essential. FUN'DAMEN'TALS, n. plu. *-tălz*, essential parts, as fundamental truths. In the Christian system of facts and truths, certain points are fundamentals, i. e. essential in the very existence of the system; yet it is a mistake thence to conclude that *knowledge* on those points is fundamental to an actual Christian estate known as a 'state of salvation,' since such a conclusion would shut out the patriarchs and prophets. But a wilful ignorance or neglect of these fundamentals would be fatal to Christian life. FUN'DAMEN'TALLY, ad. *-tăl-lĭ.* FUN'DAMENTAL'ITY, n. *-tăl'ĭ-tĭ*, character of being essential. FUNDAMENTAL BASS, in *music*, the root or foundation note of the harmony: see HARMONY.

FUNDI, *fŭn'dĭ*, or FUNDUNGI, *fŭn-dŭn'jĭ* (*Paspalum exile*): kind of grain much cultivated in the w. of Africa; allied to the millets, and still more nearly to some kinds of grain cultivated in India: see PASPALUM. It is wholesome and nutritious, and has been recommended to attention in western lands as a light and delicate food for invalids. The natives of w. Africa throw it into boiling water, pour off the water, and add plam-oil, butter, or milk. By Europeans and negroes in Sierra Leone, it is much used with stewed meat, and sometimes made into porridge with milk.

FUNDING, in finance, the conversion of floating debt into an interest-bearing obligation with a definite period, on which bonds can be issued. One such operation is of special interest in United States history, as part of the operations by which Hamilton, as leader of the Federalists (q. v.), and then secretary of the treasury, succeeded in setting the government on a firm foundation. The Act of 1790, Aug. 4, funded not only the foreign and domestic debt in full, but the State debts incurred in carrying on the Revolutionary War; the bonds were at 6 per cent, but those for the domestic debt did not bear interest till 1800.

FUNDS, PUBLIC. See DEBT, NATIONAL.

FUNDUS, n. *fŭn'dŭs* [L.]: in *anat.*, the base of any cone-shaped organ; in *bot.*, the place where the stem and root join.

FUNDY, *fŭn'dĭ*, BAY OF: arm of the Atlantic, separates Nova Scotia from New Brunswick and the state of Maine. With an average breadth of 35 m., it extends 180 m. in length n. e. to s. west. It forks, at its head, into two inlets, the n. called Chignecto Bay, and the s. Minas Channel, which are divided by narrow necks of land from the Gulf of St. Lawrence. Along its n. w. side, reckoning downward, it receives the St. John, the principal river

of New Brunswick, and the St. Croix, which, through its entire course, forms the international boundary. The navigation is perilous by the peculiarity of the tides, which are said to rise and fall 70 ft. at certain seasons.

FÜNEN. See FUHNEN.

FUNERAL, n. *fū'nĕr-ăl* [mid. L. *funerālis*, relating to a burial: F. *funérailles*—for mid. L. *fūnĕrālĭă*, a funeral: It. *funerale*, a burial—from L. *fūnŭs*, a dead body, a burial]: the ceremony of burying a dead human body: ADJ. pertaining to or used at a funeral. FUNEREAL, a *fū-nē'rĭ-ăl*, suiting a funeral; dark, solemn; mournful. FUNE'REALLY, ad. *-lĭ*. FUNERAL SACRIFICE, the slaying of men or animals to accompany the soul of an eminent person to the world of spirits; the former to give him what assistance he needs, the latter to supply him with food. It was an early and wide-spread heathen custom.

FU'NERAL RITES: methods and ceremonies of disposing of the dead. These have had vast variety as connected with observances dictated by affection, religious conviction, or superstition. For description of the principal modes of interment, and the accompanying funeral rites of the ancients, see BURIAL.

With the spread of Christianity came the decorous interring of the dead with religious offices indicative of hopes of a blessed resurrection. From the moment of death until interment, the body is the object of solemn ceremonial in the Rom. Cath. Church. At death, a crucifix is placed in the hand, or at the feet, and holy-water is sprinkled. The chief funeral rites are solemnized in the church, into which the coffin is borne and placed on a bier. Throughout France, the Netherlands, and continental Europe generally, the ordinary cortège of a funeral is a hearse with a bier, on which is the coffin, covered with a pall, followed by carriages all in black, with black horses. The same arrangement is usual in England and the United States, but the hearse, sometimes over-decorated with dark plumes, is closed instead of being open. In a more humble class of funerals, the coffin, shrouded in a pall, is borne on spokes, or on the shoulders of bearers. All the attendants are in black. A certain etiquette as to pall-bearers (in England, persons who hold ribbons attached to the pall) is observed; the relatives of the deceased taking their place nearest the head in the degree of consanguinity, and the same arrangement is maintained in lowering the coffin by cords into the grave. In the United States, pall-bearers are those who actually carry the coffin, or in some cases who walk close by its side near the men employed to bear its weight. The deposit of bodies in leaden coffins and within a vault is not a growing practice, though sometimes done: there is increasing appreciation of the propriety of allowing corpses to dissolve and mingle with the earth of the grave. There is more of religious observance in recent years than was formerly among the non-prelatical

denominations, to whom, a few generations ago, such services savored of prayers for the dead. Formerly, in the case of important personages, the hearse was preceded by a class of undertaker's men to clear the way, designated *saulies*, and gumpheon-men—these last bearing a pole shrouded at the top with black silk, called a gumpheon (*gonfalone*, a banner), being a relic of an ancient heraldic ceremonial: this custom has nearly if not altogether disappeared. At Scotch funerals, the relatives, and in some cases the friends of the deceased wear white cambric *weepers* at the wrists. In Scotland till within the present century, there was a practice of giving a series of expensive entertainments to guests at funerals, beginning with the *lykwake*, and ending with the *dredgy* (dirge); but all this is gone, or nearly so. The giving of costly entertainments was not confined to Scotland and Ireland. Taking its rise in ancient customs perpetuated by the Anglo-Saxons, the practice of consuming meat and drink in a species of gloomy festivity at funerals was common in England, and carried to an extravagant length at the decease of persons of distinction, on which occasion doles (q. v.) were also given. It had its counterpart in the usages of the ancients. In the Roman Catholic Church the body is washed immediately after death, a crucifix is placed in the hands, and a vessel of holy-water at the feet. The corpse is borne in procession from the house to the church, attended by the parish priest with acolytes and servitors all in cassock and surplice, and one of them bearing the processional cross. Before the procession moves, the priest first sprinkles the coffin with holy-water and recites the *De Profundis* and the *Miserere* while the procession is in movement. In the church the Office for the Dead is said, and after that the Mass for the Dead. After the Mass the priest, attended by the acolytes, pronounces the Absolution and certain prayers, meanwhile sprinkling the coffin with holy-water and fumigating it with frankincense. The body is then borne to the burial place. There the *Benedictus* is sung or recited, followed by the Antiphon, *Ego sum resurrectio et vita* ('I am the resurrection and the life'); the corpse is again sprinkled, a final prayer is pronounced, and the body laid away. The English Church, followed very closely by the Protestant Episcopal Church in the United States, uses the order for the Burial of the Dead in the Book of Common Prayer. The first section of the service is recited in church, or at the house of the defunct. It consists of anthem, psalms and a lesson. The second section, sometimes called the committal, is recited at the grave, where dust is scattered on the coffin as it is lowered. This is a stately and somewhat elaborate service, and is frequently used in part by other Protestant bodies.

FUNG. See Fum.

FUNGAL. See under Fungus.

FUNGI.

FUNGI [from the Latin *fungus*, a mushroom, plu. *fungi*]: the general name applied to those lower plants in the vegetable kingdom which are not of a green color. Formerly (and still to some extent in old-fashioned books), the fungi were regarded as a natural order of closely related plants, but it is now generally admitted that they include plants of a great diversity of structure and relationship. Indeed, it may now be said that between the lowest and highest fungi there is a greater difference than between the simplest mosses and the most complex of flowering plants. The name *Fungi* while formerly used to designate a group of plants has now come to be used as a convenient term by which we may refer to the lower colorless plants. This usage is quite like that which we find in zoology where the word 'Invertebrate' is still used in a popular way when referring to animals below the 'Vertebrates.'

The number of the fungi is very great, the later estimates reaching 60,000 or more species, and since many new species are still being described by scientific men in all parts of the world it is quite probable that eventually this number may be doubled or trebled. Some idea of the number of species may be realized when it is stated that Saccardo in his work entitled the *Sylloge Fungorum* fills fifteen large volumes with their descriptions. In size they range from the extremely minute one-celled bacteria, no more than one thousandth of a millimeter in diameter to puff-balls, toadstools and bracket-fungi which are nearly a meter in extent. They grow in all situations, and in all regions of the earth, from the putrid waters of stagnant pools and the plants and animals in them, to the leaves and stems of the largest trees, and the external and internal tissues of animals and even of man himself. They are ubiquitous and cosmopolitan.

One of the most interesting relations of the fungi is that through which they produce diseases in plants, since it is now well known that the majority of plant diseases are due to the presence of fungi. The number of fungi which cause plant diseases is very large, and within the last few years many botanists have given this branch of the subject (known as PLANT PATHOLOGY, q.v.) much attention. In the United States Department of Agriculture there is a large corps of plant pathologists who are making special studies of various important plant diseases, and nearly every agricultural experiment station throughout the country has a botanist whose chief work is to investigate the plant diseases of his particular state.

Plant diseases include many *fruit rots* caused by bacteria and the smaller fungi: *blights* of many kinds, e.g., the apple blight, pear blight, etc.; *rusts*, as wheat rust, oat rust, etc.; *smuts*, as wheat smut, corn smut, etc.; *leaf-spots*, as the leaf-spot of the strawberry, the beet, etc.; *stem rots*, as in the case of many trees which become weakened and eventually hollow; *scabs*, as on the potato, beet, apple, etc.; *canker*, as on the twigs and stems of the

apple; *damping off*, as often occurs in cuttings and seedlings in propagating beds, etc., etc. The injury done by these diseases annually is very great, that by wheat rust alone often amounting to millions of dollars for a single state. This fact will account for the great attention which is given to this branch of the study of the fungi.

In like manner many fungi produce diseases in animals and man. Thus it is now known that many animal diseases are caused by bacteria of various kinds, while a few are due to the presence of fungi of higher structure as some of the moulds. A familiar example of a disease produced by a fungus is the so-called fly-cholera which destroys myriads of houseflies every autumn. The fungus is a minute species of *Entomophthora* (*E. muscæ*), which penetrates the tissues of the fly and eventually bores through the skin and there forms a multitude of spores. At this stage the fly dies, and may be found adhering to the wall

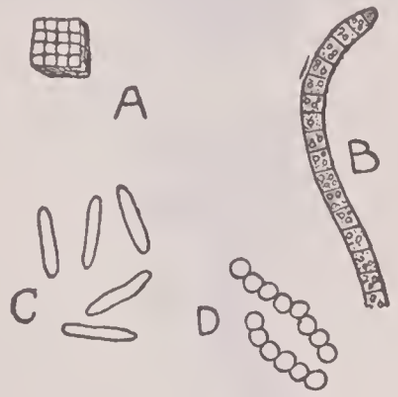


Fig. 1. Bacteria; (A.) *Sarcina*, (B.) *Beggiatoa*, (C.) *Bacillus*, (D.) *Leuconostoc*, all greatly magnified.

or some object in the room, surrounded with a 'halo' of spores. A similar and allied species destroys grasshoppers, in the autumn. In a slightly different way many fungi are harmful to man and other higher animals, as in the case of those species which are poisonous when eaten. Some of the higher fungi, as the toadstools, are so harmful as to be ranked among the deadly poisons. Thus the Death Cups (*Amanita*) when eaten produce fatal poisoning, as is also the case with species of *Russula*, as well as many other genera.

On the contrary, attention may here be called to the many edible species of fungi. Among these may be mentioned the Truffle (*Tuber aestivum*) an underground fungus fruit-body about the size of a walnut, and of a cheese-like consistency. It is a native of Europe, where it is collected by the aid of trained dogs, and pigs, and preserved for shipment to all parts of the world. The puff-balls of several genera are edible, and are used somewhat by mycophagists (fungus eaters), as are also the species of coral fungi (*Clavaria*), the Morels (*Morchella*), etc. The most commonly eaten fungus is the common mushroom (*Agaricus campestris*) which is extensively cultivated by gardeners.

Some fungi have been used in medicine, and ergot is still an official drug. The dusty spores of the puff-balls have been used as a styptic in case of bleeding wounds. Some of the leathery shelf-fungi (*Polyporeæ*) have been used in the making of a cheap tinder. Here may be mentioned the curious phosphorescence of decaying wood when penetrated and overrun by the filaments of certain fungi, probably species of toadstools or puff-balls.

Scientifically speaking, the fungi are examples of degenerate plants. All typical or normal plants possess the green coloring matter called chlorophyll, by means of which they are able to elaborate food for themselves out of the supply of the water and carbon dioxide to which

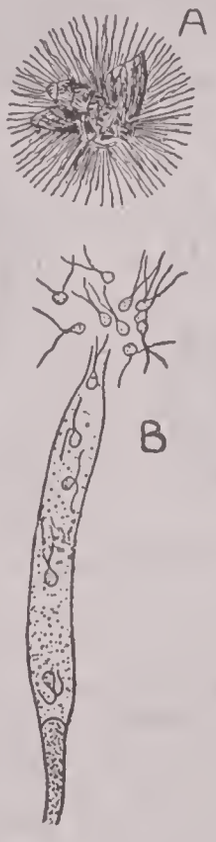


Fig. 2. Saprolegnia; (A.) on a dead fly, natural size, (B.) a filament highly magnified, showing zoospores.

they have access. Such green plants—'holophytes'—are independent, and can maintain themselves wherever the physical environment is propitious. With the fungi it is not so. They can not make food for themselves, but must get it from other plants, or from animals. Some fungi, as said above, are parasitic on other plants, while some are parasitic on animals. Others again live upon the dead parts of other plants, while still others live upon the dead remains of animals. There are thus the 'parasites,' and the 'saprophytes' (from the Greek 'sapros,' rotten, and 'phyton,' plant) among the fungi. Now it is well known in biology that parasitism and saprophytism result in the degeneration of the organisms which get their food through either of these ways. First of all parasites and sapro-

phytes ('hysterophytes' we may call them, from the Greek 'hysteros,' inferior, and 'phyton' plant) lose their chlorophyll, and with it the organs (leaves, or masses of green cells) that contained it. Thus hysterophytes become leafless, and with the absence of leaves there is no need of extensive stems and branches. Such plants thus become colorless, and their vegetative structure is reduced in size, and developed especially for absorbing food from living or dead plants or animals. At the same time the means for reproduction must be increased, since the hysterophyte can live only where its food is found. Accordingly it is the rule that the spores of the fungi are much more numerous than in their corresponding holophytic relatives.

It follows, then, that in the consideration of the fungi we are to regard them as plants which have suffered degeneration from various types of green plants, and they must accordingly be given place near such relatives in the natural classification of the vegetable kingdom. This

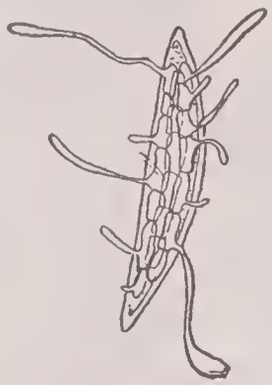


Fig. 3. Ancylistes; a desmid cell (*Closterium*) filled with the parasites.

has been attempted in the following outline of the classification of the fungi. See ALGAE.

BRANCH PROTOPHYTA. (Water Slimes).—This branch includes but one class, viz: Class Cyanophyceæ.—Very simple plants, with a poorly defined nucleus in each cell, and a bluish-green coloring matter. There are two orders, and a half dozen families, as follows, some of which contain 'bacteria,' i.e., degenerated, colorless protophytes.

Order *Cystiphoræ*, of typically one-celled plants.

Family *Chroococcaceæ*, with many blue-green holophytes, and one genus,—*Sarcina*,—of bacteria.

(Fig. 1 A.)

Order *Nematogeneæ*, of typically filamentous plants.

Family *Oscillatoriaceæ*, with the cells of each filament alike, and typically blue-green. Here many genera contain bacteria, as *Beggiatoa* (Fig. 1 B.). *Bacillus*, (Fig. 1 C.), *Vibrio*, *Spirillum*, *Bacterium*, etc.

Family *Nostocaceæ*, with the cells not all alike in each filament (*heterocysts* present) and typically blue-green or amber-green. Here, also, some genera contain bacteria, as *Leuconostoc* (Fig. 1 D), *Staphylococcus*, etc.

The remaining families of the Protophyta contain no fungi, and need not be noticed here.

In most recent books on the fungi many families are aggregated into a group to which the name 'Phycomycetes' (literally algo-fungi) has been given. They are all plants of a filamentous structure resembling the simpler algæ, to which they are doubtless closely related. A close examination of these algo-fungi shows that they do not constitute a single genetic or natural group but that they consist of three or four rather distinct families or groups of families, all related to the algæ of the Class *Chlorophyceæ* (Green Algæ) in the branch *Phycophyta*. The following classification of the Phycomycetes is in accordance with the foregoing views.

Branch Phycophyta (The Spore Tangles).—Single cells, threads, or masses, the latter forming a branching plant with rhizoids; reproducing asexually (propagation)

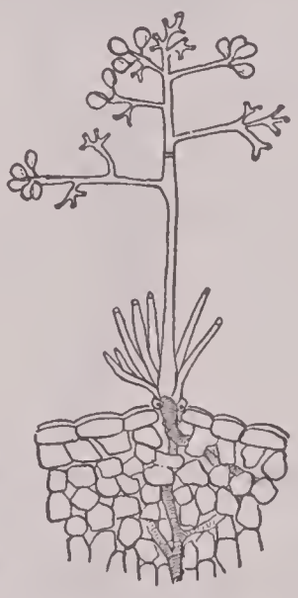


Fig. 4. *Plasmopara viticola;* conidiophore growing from leaf tissue of Grape: highly magnified.

by fission, and sexually (generation) by the union of two protoplasts (gametes) to form a single spore (zygote) which is often a resting-spore. Plants from microscopic to large, sometimes a hundred meters or more in length, mostly aquatic, normally containing chlorophyll in chromatophores, but this often obscured by a yellowish or a brownish coloring matter (phycoxanthin and phycophæin), exceptionally without chlorophyll (as in the hysterophytes).

There are two classes which may be separated as follows:

A. Mostly one-celled or filamentous (rarely stratose or tabular) plants, mostly chlorophyll-green, or yellowish (colorless in hysterophytes), (*Chlorophyceæ*)

B. Mostly massive or filamentous (very rarely one-celled) plants, brown or olive-green (no hysterophytes in this class), (*Phæophyceæ*).

Class Chlorophyceæ (Green Algæ).—Plant-body from microscopic single cells to large multinucleate, non-sep-

tate, branching coenocytes, or threads of cells, simple or branched, or rarely plates or tubes of cells; cells containing chlorophyll (excepting in hysterophytes) and thus bright green, but this sometimes obscured by phycoxanthin and then yellowish or brownish; asexual reproduction (propagation) by fission of the whole plant or some of its parts, or by zoospores; sexual reproduction (generation) by the formation of a zygote (usually within the parent plant) as the result of the union of equal, undifferentiated gametes (isogametes), or of unequal male and female gametes (heterogametes), i.e., androgametes and gynogametes), which are motile zoospores (planogametes) or motionless protoplasts (aplanogametes), as follows: (I) isogamy, (1) both planogametes, (2) both aplanogametes; (II) heterogamy, (3) androgametes and gynogametes motile, (4) androgametes (now called antherozoids) motile, gynogametes (now called oospheres or eggs) motionless. Typically fresh-water plants ('fresh-water algæ'), but

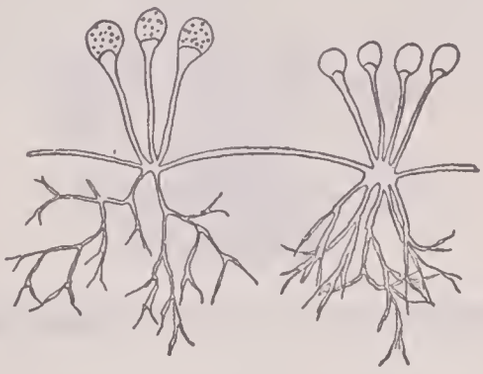


Fig. 5. *Mucor mucedo* conidiophores and 'roots', highly magnified.

with many marine species also. Their zoospores and antherozoids usually have two terminal cilia, sometimes four, or a crown, rarely they are ciliated throughout. The hysterophytes are parasitic or saprophytic, and colorless, and show more or less morphological degradation. (Species, 7,000 to 8,000.)

The four orders may be separated as follows:

A. Plants all unicellular; generation planogametic (*Protococcoideæ*).
B. Plants filamentous or stratose; generation from planogametic isogamy to gynogametic heterogamy (*Confervoideæ*).
C. Plants filamentous (or unicellular by solution); generation aplanogametic. (No hysterophytes in this class). (*Conjugatæ*).
D. Plants tubular or spheroidal coenocytic; generation from planogametic isogamy to gynogametic heterogamy (*Siphonales*).

Order PROTOCOCCOIDEÆ (Green Slimes).—Plants microscopic, unicellular, but sometimes aggregated into definite and regular colonies, green (except in the hysterophytes), with mostly parietal chromatophores, occasionally concealed in old plants by a red pigment; propagation by cell-division and zoospores, and the formation of agamic, thick-walled resting spores (chlamydospores); generation isogametic; or heterogametic, resulting in the formation of a single zygote.

There are five families in this order separated as follows:

A. Vegetative cells not ciliated,
  I. Cells single, or in loose irregular colonies, or in gelatinous masses,
    a. Cells containing chlorophyll,
      1. Not forming zoospores (*Pleurococcaceæ*).
      2. Forming zoospores (*Protococcaceæ*).
    b. Cells without chlorophyll (*Synchytriaceæ*).
  II. Cells aggregated into regular colonies (*Hydrodictyaceæ*).
B. Vegetative cells ciliated (*Volvocaceæ*).

But one of the foregoing families, the *Synchytriaceae*, is composed of fungi, and accordingly the others will not be noticed further at this time.

Family SYNCHYTRIACEÆ (The Gall-fungi).—Vegetative cells mostly spherical or ellipsoidal, not ciliated, without chlorophyll, growing solitary or merely approximated in the cells of aquatic or terrestrial plants, each eventually becoming a zoosporangium, or dividing into several to many zoosporangia; propagation by zoospores, and the formation of agamic resting spores; generation by the union of two equal, free-swimming, uniciliate gametes (known for but one genus). Eight or more genera of

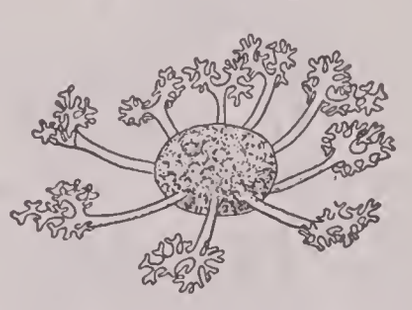


Fig. 6. *Microsphæra alni;* a ripe fruit with its branched appendages; highly magnified.

these minute parasites are known, some, (e.g., *Olpidium*, *Reessia* and *Rozella*) inhabiting various water plants and others (e.g., *Synchytrium* and *Pycnochytrium*) the tissues of higher plants on which they produce small colored galls.

Order CONFERVOIDEÆ (The Confervas).—Plants filamentous or stratose, sometimes imperfectly septate, the segments being multinucleate, and therefore coencytes, green, with definite ovoid or lamelliform chromatophores (except in hysterophytes); propagation by the fracture of the filaments, or the formation of zoospores; generation by the union of two planogametes (isogametes or heterogametes), or of eggs (gynogametes) and antherozoids (androgametes).—Mostly fresh-water algæ, floating on ponds and in running waters. There are half a dozen or more families, but one of which is hysterophytic.

A. Plants stratose, cells in one or two layers (*Ulvaceæ*).
B. Plants filamentous.
  I. Generation isogamic.
    1. Elongated filiform, mostly simple (*Ulotrichaceæ*).
    2. Minute, short filiform, branched (*Chroolepidiaceæ*).
  II. Generation heterogamic.
    a. Both gametes biciliated, motile.
      1. Several eggs in each oogonium (*Sphaeropleaceæ*).
      2. One egg in each oogonium (*Cylindrocapsaceæ*).
    b. Only the antherozoids ciliated.
      1. Plants green (holophytes) (*Oedogoniaceæ*).
      2. Plants colorless (hysterophytes) (*Monoblepharidaceæ*).

Family *Monoblepharidaceæ*.—Plants filamentous, tubular below, septate above, branching, colorless; propagation by uniciliated swarmspores (zoospores); generation by the union of uniciliated antherozoids with large eggs produced singly in terminal or intercalary oogonia; antherids usually near the oogones, subterminal.—Small saprophytic fungi found in water on decaying plants and animals. But one genus is known, viz., *Monoblepharis*, containing two or three species.

Order Siphonales (The Tube Algæ).—Plants saccate or tubular, often much branched, non-septate or partially septate, multinucleate and therefore coenocytic, the filaments sometimes aggregated into plants of definite form, green (except in hysterophytes) with discoid, parietal chromatophores; propagation by (1) the internal division of the protoplasm of a part (sporangium), or the whole of the plant into spores,—in water into zoospores,—in the air into walled spores; (2) the contraction of definite masses of protoplasm into agamic resting spores (aplanospores or chlamydospores); generation by the union of (1) ciliated isogametes, (2) ciliated heterogametes, (3) antherozoids with non-ciliated gynogametes, (4) antherid nuclei (non-ciliated) with non-ciliated gynogametes, in all

Fig. 7. *Peziza fusispora;* five fruits, natural size.

cases producing zygotes.—Fresh-water and marine algæ, and many filamentous fungi (hysterophytes), including many families only a few of which are indicated in the following key.

A. Generation, where known, isogamie.
  I. Plants small to large, branched, septate, very rarely non-septate (holophytes) (*Valoniaceæ*).
  II. Plants minute, clavate, pyriform, or spherical, terminating below in a simple or branched rhizoid, non-septate.
    a. Plants green (holophytes) (*Botrydiaceæ*).
    b. Plants colorless (hysterophytes) (*Chytridiaceæ*).

B. Generation, where known, typically heterogamic.
  1. Plants consisting of long, branching, non-septate filaments (in some hysterophytes very much reduced).
    a. Chlorophyll-bearing (holophytes) (*Vaucheriaceæ*).
    b. Without chlorophyll (hysterophytes).
      1. Aquatic, parasitic and saprophytic on aquatic plants and animals.
        a. Plants consisting of well-developed free filaments and endogenous rhizoids (*Saprolegniaceæ*).
        b. Plants consisting of endogenous filaments, no rhizoids.
          1. Filaments branched (*Cladochytriaceæ*).
          2. Filaments simple, sometimes reduced to one or two cells (*Ancylistaceæ*).
      2. Not aquatic.
        a. Parasitic in the tissues of higher plants (rarely aquatic, and parasitic or saprophytic) (*Peronosporaceæ*).
        b. Saprophytic on various substances or parasitic on other fungi (rarely aquatic) (*Mucoraceæ*).
        c. Parasitic in the bodies of insects (rarely in plants, still more rarely saprophytic) (*Entomophthoraceæ*).

Family *Chytridiaceæ* (The Pond-Scum Parasites).—Plants minute, saccate, spherical to elongated, parasitic or saprophytic, colorless, with a simple or branching rhizoid below, the latter penetrating the host; propagation (1) by the division of the protoplasm of the plant body into spherical, uniciliate zoospores, which escape through special openings, or (2) by the transformation of the protoplasm into an agamic resting spore, or (3) by the formation of resting spores in the rhizoids; generation unknown (or of doubtful occurrence in *Polyphagus*). Six or more genera, e.g., *Rhizidium*, *Chytridium*, etc., are included in this family, most of which are parasitic in the cells of pond-scums and other minute aquatic plants.

Family *Saprolegniaceæ* (Water Moulds).—Plants minute, aquatic, without chlorophyll, parasitic or saprophytic on animals and plants, consisting of mostly branching, non-septate (or sparingly septate) filaments, attached by branching rhizoids which penetrate their hosts; propagation (1) by the formation of numerous, mostly biciliate, zoospores in the ends of branches set off by cross-walls, or

Fig. 8. Top view of a plant of *Physcia stellaris*, natural size, showing fruits.

by the formation of aplanospores, (2) by the formation of single spherical conidia ('chalmydospores'); generation by the formation of one or more eggs in each more or less spherical oogone, which are fertilized by the transfusion of the protoplasm of the clavate antherid (usually originating near by) through slender fertilizing tubes which penetrate the oogone wall. (Occasionally the eggs develop without fertilization.) The dozen or more genera contain many species, some of which are parasitic upon living aquatic animals, as fishes, tadpoles, etc., while others are saprophytic upon decaying animal or vegetable matter. *Saprolegnia ferax* is parasitic on fishes and is often the cause of much destruction. (Fig. 2).

Family *Cladochytriaceæ*.—Plant a reduced, slender, parasitic or saprophytic, much-branched, non-septate filament, developing terminal and intercalary enlargements, which become (1) zoosporangia, or (2) resting spores (probably agamic); zoospores spherical or ellipsoid, uniciliate, escaping through a tube or papillary orifice; antherids and oogones appear to be wanting.—Minute parasites of two genera and few species in the parenchyma cells of aquatic higher plants, or the slimy secretions of green algæ. (In this family, which is doubt-

less related to the *Saprolegniaceæ*, the structural degeneration, due to their hysterophytic habits, appears to have affected the sexual reproductive organs more than the vegetative filaments. Compare also with *Ancylistaceæ*.)

Family *Ancylistaceæ*.—Plant a reduced, parasitic, colorless filament (sometimes a single cell, or even a naked mass of protoplasm), at first non-septate, later dividing into several cells which (1) become zoosporangia and divide into zoospores, which are mostly biciliate, or (2) develop long germinating tubes which penetrate new hosts, or (3)

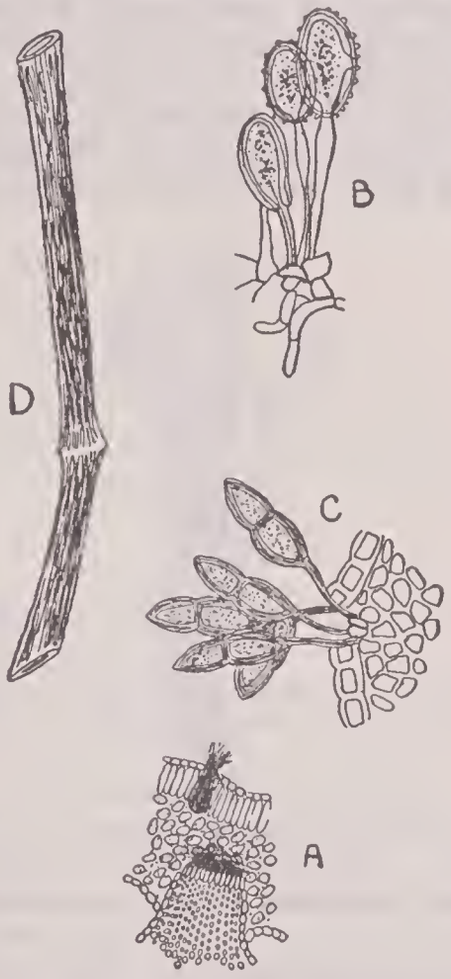


Fig. 9. *Puccinia graminis:* (A.) Cluster cup stage on Barberry leaf, much magnified; (B.) Red-rust stage on wheat, much magnified; (C.) Black-rust stage on wheat, much magnified; (D.) Black-rust stage on wheat, natural size.

transform into antherids or oogones; the single egg within the oogone is fertilized by means of a tube, resulting in the production of a thick-walled zygote. (In *Diplophysa* and *Rhizomyxa* the single cell composing the whole plant may form a single zoosporangium, or by division, an antherid and an oogone.)—Minute parasites of few genera and species living in the cells of various aquatic plants (Fig. 3), and the root hairs and epidermal cells of higher plants. (In this family, which is doubtless related to the *Saprolegniacæ*, the structural degeneration, due to their hysterophytic habits appears to have affected the vegetative filaments more than the sexual reproductive organs. Compare with *Cladochytriaceæ*.)

Family *Peronosporaceæ* (Downy Mildews).—Plants minute, without chlorophyll, mostly endophytic, and typically parasitic (rarely aquatic, and parasitic or saprophytic on animals or plants), consisting of much-branched, non-septate filaments which penetrate their hosts, and from which they send out (into the air or water) slender, more or less branched conidiophores; rhizoids not present; propagation by the formation of conidia which may give rise to laterally biciliate, usually reniform, zoospores (1) immediately (then known as zoosporangia), or (2) after falling (then known as metasporangia), or they may germinate after falling, by sending out a slender tube which grows directly into a new filament; zoospores after a period of activity, becoming spherical, motionless cells and germinating by sending out a slender tube which forms a new filament; generation by the formation of a single spherical egg in each globular oogone, which is then

Fig. 10. *Glœosporium* on bean pod, natural size.

fertilized by the transfusion of the protoplasm of the clavate antherid (usually originating near by) through the slender fertilizing tube, resulting in the formation of a thick-walled zygote; the latter germinates directly, or by the formation of zoospores. The eight genera and many species include some of the most destructive parasitic fungi, as the White Rusts (*Albugo*), the Potato Rot (*Phytophthora infestans*), Grape Mildew (*Plasmopara viticola* Fig. 4), Crucifer Mildew (*Peronospora parasitica*), etc.

Family *Mucoraceæ* (Black Moulds).—Plants saprophytic, or parasitic, consisting of much branched, non-septate vegetative filaments, which bear the more or less erect sporophores, the former more or less rhizoid-like and penetrating the substratum, the latter aerial (in one genus aquatic), cylindrical or swollen, simple or branched, and often bearing rhizoids below; propagation (1) by

the internal division of the end cells of the aerial branches (sporophores) into internal spores, (*a*) in single enlarged end cells (sporangia) each producing few to many irregularly arranged spores (zoospores in one genus), and (*b*) in several or many narrow (or spherical) end cells, each producing one, or more often, few to many spores in a single row, these set free as a row of spores ('conidia') by the early dissolution or fracture of the sporangial wall (sometimes apparently formed by abstriction); (2) by the formation of thick-walled resting cells (chlamydospores) in the vegetative filaments; generation by the coming together of two usually lateral branches, mostly upon vegetative filaments, the formation of a septum near the end of each, the absorption of the wall between the united cells, and the fusion of their contents into a zygote, which eventually becomes thick-walled. A dozen or more genera contain

Fig. 11. *Lycoperdon gemmatum;* a fruit somewhat reduced in size.

the many species including numerous species of *Mucor* (Fig. 5), common on bread and pastery, *Hydrogera* on excrement, etc.

Family *Entomophthoraceæ* (Insect Fungi).—Plants parasitic in the bodies of insects (rarely endophytic or saprophytic), consisting of much-branched, tubular, mostly endozoic, filaments, eventually septate, and often separating into distinct segments, sometimes bearing rhizoids which attach the host to the substratum; propagation by the abstriction of single conidia from the ends of short, aerial filaments and by the asexual formation of resting spores in the vegetative filaments; generation (mostly within the host) by the union of two approximate or adjacent cells or segments, and the development of a thick-walled zygote. Here are the fly cholera (*Entomophthora muscae*) grasshopper fungus (*E. grylli*) and many others that destroy insects.

Branch Carpophyta (The Fruit Tangles).—Filamentous or massive plants, simple or more commonly branched, rooted below, and attached to their supports: typically green plants, in one class red by the addition of a red coloring matter to the cell contents. Propagation by zoospores or detached cells (tetraspores, conidia, etc.): generation by the fertilization of an egg-cell (in a carpo-

gone) by the contents of an antherid, followed by the growth of (a) the fertilized egg into one or many spores, and (b) a mass of sterile protective tissue about the former, so as to constitute a primitive 'fruit.'

This immense group of plants includes the Red Seaweeds, the Stoneworts, and a small group of minute algae (*Coleochæte*) all of which have chlorophyll in their cells, and two groups of fungi. These may be separated as classes as follows:

Minute, green, fresh-water plants; fruit-spores few. (*Coleochaeteæ*).
Red or purple, mostly marine plants; fruit-spores many. (*Rhodophyceæ*).
Colorless, mostly parasitic plants; fruit-spores many, enclosed in sacs. (*Ascomyceteæ*).
Colorless, mostly saprophytic plants; fruit spores many, borne on stalks. *Basidiomyceteæ*).
Large, green, fresh-water plants; fruit-spore one. (*Charophyceæ*).

Only the third and fourth classes contain fungi, and need be noticed further.

Fig. 12. *Agaricus campestris;* a single expanded fruit and five small ones; considerably reduced in size.

Class Ascomyceteæ (The Sac Fungi).—The plants of this class consist of branching threads, sometimes compacted into string-like or felt-like masses, which penetrate the host or substratum from which they absorb food matter for their sustenance. Later upon these threads there commonly arise vertical threads whose end cells become detached as spores (summer spores, or conidia). These constitute the asexual mode of reproduction. In some members of this class antherids and egg-cells are known, and the latter upon fertilization send out lateral branches whose end cells become spore-sacs (asci). Sterile threads arise from cells adjacent to the egg-cell, and grow up so as to constitute a protecting covering (perithecium), or mingling with the fertile threads form an open fruit-body (apothecium).

FUNGI.

In this class there have been enumerated approximately 40,000 species, ranging from minute plants of microscopic size to those which are as large as one's hand, or even larger. They include some of the most harmful parasites upon our fruits and crops. They may be grouped into half a dozen or more orders.

Order PERISPORIACEÆ (the Simple Sac Fungi), include for the most part the Powdery Mildews (as *Erysiphe, Microsphaera,* etc.) (Fig. 6), which are common parasites on the epidermis of the leaves and stems of many plants, as lilacs, grapes, apples, peas, cherries, etc.

Order TUBEROIDEÆ (the Truffles), are subterranean saprophytes, whose compound fruit-bodies are edible, especially of the species of *Tuber.*

Order PYRENOMYCETEÆ (the Black Fungi), are mostly small parasitic fungi producing usually black and hard fruit-bodies. A familiar example is the Black Knot of the plum and cherry tree (*Plowrightia morbosa*).

Fig. 13. *Boletus subtomentosus;* a fruit considerably reduced in size.

Order DISCOMYCETEÆ (the Cup Fungi), are mostly saprophytes, producing mostly softish cup-shaped fruit-bodies.

The common cup fungus (*Peziza* Fig. 7), and the Morel (*Morchella*) are good representatives of this order. Many cup-fungi are parasitic on lower green plants (*Protococcus,* etc.), on tree trunks and are then known as *Lichens* (q.v.). Among lichen fungi the more common genera are *Physcia* Fig. 8), *Cladonia, Usnea,* etc.

Order UREDINALES (the Rusts), may be regarded as greatly degenerated cup fungi, in which the spore sacs (asci) contain only one or two, rarely more, spores. They live parasitically in the tissues of plants, coming to the surface to form their spores. The genus *Puccinia* contains many of the rusts of the cereals and other farm crops. *Puccinia graminis* (Fig. 9), is common on wheat.

Order USTILAGINALES (the Smuts), are still more degenerated plants, related to the rusts. They grow in the tissues of the higher plants, and usually form their spores

in the flowers or seeds of their hosts. Thus the smut of wheat (*Ustilago tritici*) forms a mass of spores in the young wheat kernel, and the smut of Indian corn (*U. maydis*) fills the young corn kernels with masses of black spores.

Here may be placed the so-called 'Imperfect Fungi' which are now generally regarded as imperfect or incomplete Sac Fungi. It is quite certain that many of them are conidial stages of Sac Fungi, whose later stages have not yet been made out. It is possible that some Imperfect Fungi have lost their other stages through excessive degeneration. There are three provisional orders as follows:

Order SPHAEROPSIDEÆ (the Spot-Fungi), are mostly parasitic on the leaves and fruits of higher plants, producing whitish or discolored spots, as in species of *Phyllosticta*, *Septoria*, etc.

Fig. 14. *Clavaria botrytes;* a fruiting mass considerably reduced in size.

Order MELANCONIEÆ (the Black-dot Fungi), which produce small, dark-colored or black dots, as in *Glœosporium* (Fig. 10), *Melanconium*, etc.

Order HYPHOMYCETEÆ (the Moulds), grow out through the stomata of leaves and fruits in delicate spore-bearing tufts, as in *Cercospora*, *Ramularia*, etc.

Class BASIDIOMYCETEÆ (the Club-Fungi).—Here the real plants are the branching threads which grow through the soil, the decaying organic matter, or the living tissues of some higher plant. Later in the growth of the threads they develop fruits of various shapes and these latter are the portions of the plants that we commonly see. Little is known as to their asexual reproduction, but in some cases we know of a conidial development. Less still is known as to the formation of sexual organs, but it may be assumed that if they are still present they immediately precede the formation of the fruit-bodies. Some botanists think that the sexual organs have disappeared as a result of the great degeneracy of these plants.

In all Club-Fungi the spores are produced upon the surface of certain club-shaped end-cells (*basidia*) which are here regarded as the homologues of the spore sacs of the Sac Fungi.

About 12,000 species of Club Fungi are known. They are usually separated into two orders, as follows:

Order GASTEROMYCETEÆ (the Puff-Balls), are plants in which the fruit bodies are mostly rounded, with the spore-bearing tissue internal. Here we find the true Puff-Balls (*Lycoperdon* (Fig. 11), *Geastar*, *Bovista*, etc.) as well as the pretty Bird-nest Fungi (*Crucibulum*) and the bad-smelling Stinkhorn Fungi (*Phallus*, *Simblum*, etc.). Most species of this order are saprophytic.

Order HYMENOMYCETEÆ (the Toadstools), have a similar white filamentous plant body growing in the ground or other substratum, or even becoming parasitic in certain species. The fruit-bodies are typically stalked, umbrella-

Fig. 15. A Bracket-fungus (*Fomes*) growing from a tree trunk; considerably reduced in size.

shaped structures, as well shown in the common toadstools of the fields. In these the spores are borne on the surfaces of the 'gills' on the under surface of the cap. The common Mushroom *Agaricus campestris* (Fig. 12), is a typical example of the structure of the fruit-body in this order. In some related genera the spores are borne in pores (*Polyporus*, *Boletus* (Fig. 13), etc.), while in still others the spore-bearing surface is developed into prickle-like projections (*Hydnum*) or much branched structures (*Clavaria*) (Fig. 14).

While typically these fruit-bodies are stalked, bearing a rounded cap, the stalk may be wanting and the cap unsymmetrical and sessile, as in the Bracket Fungi (*Polyporus*, *Fomes* (Fig. 15), etc.).

Bibliography.—In the study of the fungi the scientific student will find Saccardo's *Sylloge Fungorum* indispensable, and also the several parts of the first volume of Engler and Prantl's *Natürliche Pflanzenfamilien.* The general student may profitably consult Underwood's *Moulds, Mildews and Mushrooms*, Atkinson's *Mushrooms*, and McIlvane's *One Thousand American Fungi.*

FUNGIA, n. *fŭn'jĭ-a* [L. *fungus*, a mushroom, from a resemblance to a fungus or mushroom]: genus of corals, typical of *Fungidæ*, sub-tribe *Aporosa*.

FUNGIBLES, *fŭn'jĭ-blz*, in Roman Law: movable articles which, in fulfilling contracts or returning loans, could be paid or returned by articles equivalent. The contract of loan was divided into *mutuum* and *commodatum*, a division which has been adopted by the law of Scotland, and by most of the European continental systems founded on the civil law. The former (*mutuum*) had reference to objects which admitted of being estimated by weight, measure, or number, or which could not be used without being given away or consumed; e.g., money, grain, wine, oil, and the like, which could be used only by him who possessed the full right of ownership, and consequently the contract of *mutuum* transferred the ownership to the borrower, who became bound to return not the object borrowed, but its equivalent. Objects of this nature were called fungibles, as distinguished from those transferred to the borrower, (on contract of *commodatum*) on condition that he should return the same individual objects to the lender.

FUNGINE, n. *fŭn'jĭn:* in *chem.*, metacellulose; variety of cellulose found in fungi and lichens.

FUNGUS, n. *fŭng'gŭs*, FUNGI, n. plu. *fŭn'jī*, sometimes FUNGUSES, n. plu. *fŭng gŭs-ĕs* [L. *fungus*, a mushroom or toadstool: It. *fungo:* F. *fongus*]: a mushroom or toadstool; a cryptogamic plant not containing chlorophyl; any spongy excrescence on a plant or animal; see FUNGUS, in Pathology and Surgery. FUNGI, n. plu. *fŭn'jī*, an order of plants. FUN'GAL, n. *-găl*, a fungus. FUNGALES, n. *fŭng-gā'lĕz*, an alliance of thallogens, corresponding to the old order *Fungi*. FUNGOLOGIST, n. *fŭng-gŏl'o-jĭst*, one skilled in fungology. FUNGOL'OGY, n. *-o-jĭ*, a treatise on fungi; the science of fungi; mycology. FUNGOUS, a. *fŭng'gŭs*, of or resembling a fungus; soft; spongy. FUNGOS'ITY, n. *-gŏs'ĭ-tĭ*, soft excrescence. FUNGIA, n. *fŭn'jĭ-ă*, a mushroom-like genus of corals. FUN'GIC, a. *-jĭk*, denoting an acid obtained from mushrooms. FUN'GIFORM, a. *-fawrm* [L. *forma*, shape]: headed like a mushroom. FUN'GITE, n. *-jīt*, a fossil fungiform coral. FUNGIV'OROUS, a. *-jĭv'ō-rŭs* [L. *vŏrō*, I devour]: feeding on mushrooms. FUNGOID, a. *fung'goyd* [Gr. *eidos*, likeness]: resembling a mushroom.

FUN'GUS, in Pathology and Surgery: term with several significations. Thus any excrescence from a surface of skin or mucous membrane, or even from deeper parts, is sometimes called fungus, especially if it have a soft mushroom-like character, and a broad short pedicle. When the pedicle is long and narrow, it is called polypus (q. v.) The growths to which chiefly the term fungus is applied are those which have the characters of cancer (q.v.); especially *fungus hæmatōdes*, a very dangerous variety. But fungus has still another appli-

cation in pathology, to those minute incrustations and alterations of the skin dependent on the growth of vegetable parasites, as Favus and Ringworm (q. v.).

FUNICLE, n. *fū'nĭ-kl* [L. *fūnĭcŭlŭs*, a slender rope—from *fūnis*, a cord: It. *funicolo:* F. *funicule*]: in *bot.*, a cord-like appendage by which, in many cases, the seeds are attached. FUNICULAR, a. *fū-nik'ū-ler*, consisting of a funicle. FUNICULATE, a. *-lāt*, in *zool.*, having a narrow ridge like a string. FUNIFORM, a. *fū'nĭ-fawrm* [L. *forma*, shape]: resembling a cord or cable. FUNICULAR CURVE, curve in which a perfectly flexible string hangs when supported at the extremities. FUNICULAR POLYGON, the figure assumed by a string supported at its extremities, and acted on by several forces.

FUNK, n. *fŭngk* [prov. F. *fun*, smoke: Wall. *funki*, to smoke]: a strong rank smell, as that of tobacco; perturbation manifested by smell, fright; dudgeon: V. to fear; to be in a fright. FUNK'ING, imp. FUNKED, pp. *fŭnkt*.

FUNK, ISAAC KAUFMANN, D.D., LL.D.: American clergyman and publisher, b. Clifton, Ohio, 1839, Sept. 10. He was educated at Wittenberg College, Springfield, Ohio, whence he graduated (1860), and entered on active work in the Lutheran church near Moreshill, Ind., 1861. Subsequently he held a pastoral charge at Carey, Ohio, and later at St. Matthew's English Luth. Church, in Brooklyn, N. Y. In 1872 he resigned his pastorate to travel in Europe, Egypt, and the Holy Land. On his return he applied himself to journalism and publishing. In 1876 he founded the *Metropolitan Pulpit*, now known as the *Homiletic Review*, and was its editor-in-chief. In 1880, together with his partner and former college mate, A. W. Wagnalls, Dr. Funk started the publication of a series of standard books which became very popular, and in 1884 issued Spurgeon's *Treasury of David*. About this time he started *The Voice* as a campaign paper in the interests of prohibition, and in 1885 made it a permanent publication. Together with his partner, Dr. Funk published a number of important books, the chief of which was the *Standard Dictionary*, and the *Jewish Cyclopædia*.

FUNNEL, n. *fŭn'nĕl* [W. *ffynel*, an air-hole: Bret. *flounil* or *founil*, a funnel for pouring in liquids; L. *infundĭbŭlŭm*, that which serves for pouring in, a funnel —from *in*, *fundo*, I pour]: conical vessel open at both ends, terminating in a tube, and used for pouring liquids into narrow-mouthed vessels, and in laboratories for filtering: see FILTER. For common purposes, they are made of tin-plate or copper; but for corrosive liquids, they are of glass or earthenware; also the hollow or shaft of a chimney through which smoke ascends—from its resemblance to a funnel for pouring; in *steam-vessels*, the iron tube designed to convey away above the deck the smoke and gases set at liberty during the combus-

tion of fuel under the boiler, and also, from its height, to afford a sufficient draught to the furnaces. In large ships, the funnel is of great size; and in men-of-war, usually telescopic, so that, by simple mechanism, it may be withdrawn during an action from the chance of injury by cannon-shot.

FUNNY, a. *fŭn'nĭ:* see FUN. FUN'NY-BONE, the part of the elbow over which the ulnar nerve passes, which when struck or pressed sharply, causes a sensation like an electric shock to pass down the arm.

FUNSTON, FREDERICK: an American military officer; b. 1865, Nov. 9; was educated at the Kansas State University. In 1896-97 he fought with the Cubans against Spain. When the American-Spanish war began he was made colonel of the 20th Kansas Volunteers, and accompanied them to the Philippines. On 1899, March 13, he was promoted brig-gen. of volunteers in reward for his fearless feat of swimming across the Rio Grande at Calumpit under a galling fire and fixing a rope ferry by which the Americans crossed the river and routed the insurgents. His main service, however, was the capture of Aguinaldo, 1902, March 23, at his hiding place in Palanon, Isabella Province, Luzon, for which, a week later, he was made brig.-gen. U. S. A. In 1902 he commanded the Dept. of the Colorado.

FUR, n. *fėr* [a contr. of *fodder*, used in the double sense of food, and a case of lining: OF. *forre*, a sheath, a case: Goth. *fodr*, a sheath, lining: Icel. *fodr:* Dut. *voeder*, fodder, a lining: Sp. *forro*, lining]: the soft hair of certain animals growing thick on the skin; the skin and hair when prepared; any coating considered as resembling fur, as morbid matter on the tongue, the down on a peach, etc.; calcareous incrustation in a boiler or a kettle gradually formed from the boiling water. Many spring waters contain carbonate of lime held in solution by carbonic acid: when this water is boiled, the acid is expelled, and the carbonate is deposited, often in association with a little sulphate, forming a lining more or less coherent upon the sides of the vessel. In steam-boilers, this may be prevented by the addition of a small quantity of sal-ammoniac (hydrochlorate of ammonia) to the water; double decomposition takes place, carbonate of ammonia being formed and volatilized, while chloride of calcium remains in solution. FUR, a. made of fur: V. to line or ornament with fur; to cover with morbid matter, as the tongue. FURRING, imp. *fėr'ĭng*, covering with fur: N. in *arch.*, small slips nailed on joists or rafters to fill in deficiencies, and make the boarding lying on them level. FURRED, pp. *fėrd:* ADJ. covered or ornamented with fur. FUR'RIER, *-rĭ-ėr*, a dealer in furs. FURRY, a. *fėr'ĭ*, covered with fur; consisting of fur. FURRIERY, n. *fŭr-rĭ-ėr-ĭ*, furs in general; the trade in furs. FURS, in *her.* (see below).

FUR: soft hair growing on the skins of certain ani-

mals. Fur has been used in Europe as clothing for many centuries. Since European countries however have become more and more cleared and inhabited, fur bearing animals have become scarce and the supply is now obtained chiefly from other regions, especially N. America.

For the chief fur-bearing animals, see their respective titles.—*Ermine* fur is pure white, except the tip of the tail, which is black. The spotted appearance of this fur is not natural; it is produced by sewing the black tail tips on the white fur at certain spots.—*Stoat* fur is a kind of inferior ermine.—*Sable* fur, obtained chiefly from n. Russia and Siberia, is valued in proportion to the darkness of its color.—*Marten* fur, especially that of rich dark-brown olive color, is much sought for.—*Fiery-fox* fur, brought chiefly from the n.e. part of Asia, is admired both for its brilliant fiery color and for its fineness.—*Red-fox* fur, differing in some particulars from that of the fiery-fox, is sought after by the Chinese for trimmings, linings, and robes.—*Silver-fox* fur has a perculiar lustrous silver-gray color.—*Nutria* fur, belonging to the animal called the *coypou*, is brought largely from S. America, chiefly as a cheap substitute for beaver.—*Sea-otter* fur has been known in Europe about a century and a half, being obtained from the otters which frequent the seas washing the Asiatic shores of the Russian dominions; it varies from a beautiful brown to jet-black, and is very fine, soft and glossy.—*Seal* fur is obtained from the seals frequenting various coasts, chiefly in the Northern and Southern oceans.—*Beaver* fur was formerly much in request for the manufacture of hats; but the growing scarcity of the animal, and the substitution of silk hats for beaver hats, has lessened its importance.—The fur of various other animals is similarly valued, either for warmth or beauty; such as that of the *bear*, *raccoon*, *badger*, *minx*, *lynx*, *musquash*, or *musk-rat*, *rabbit*, *hare*, *squirrel*, and *chinchilla*.

For manufacturing purposes, furs are classified into *felted* and *dressed*. Felted furs, such as beaver, nutria, hare, and rabbit, are used for hats and other felted fabrics, in which the hairs or filaments are made so to interlace or entangle as to form a very strong and close plexus. The quality of the fur is better when the skin is taken from the animal in winter than in any other season, giving rise to the distinction between 'seasoned' and 'unseasoned' skins. The removal of the fur from the pelt is a necessary preliminary to the preparation of fur for felting purposes. In many kinds of skin, such as that of the hare, the fur is of two kinds—a close short layer of felting fur next the pelt, and longer outer hairs of unfelting fur. The removal of these two is effected separately. The long hairs are cut off by a kind of shears and the true fur is then removed by the action of a knife; bearing some resemblance to a cheese-cutter, requiring much care in its management. In some sorts of skin, the long hairs are removed by pulling instead of

shearing; in others, the greasiness of the pelt renders necessary a cleansing process with soap and boiling water before the shearing; and in others, both pelt and fur are so full of grease as to require many repetitions of cleansing. For beaver skins, a machine of very beautiful construction is employed in cutting the fur from the pelt. When the coarse hairs have been removed to form a stuffing for cushions, the skin is placed in a machine containing a broad keen blade equal in length to the width of the skin. This blade has a peculiar reciprocating movement given to it, producing a kind of chopping effect on any substance to which it is applied, by coming nearly in contact with another blade placed parallel with it. The skin is guided between rollers into the space between the two blades; and then the action of the upper blade crops off the fur from the pelt in a very complete manner—every particle being removed, and yet the pelt is not cut. The fur falls upon an endless apron, which carries it to a chest, or trunk, containing a blowing-machine; this machine separates the fur into three of four qualities, by blowing to the furthest distance the lightest and most valuable filaments, leaving the heavier and coarser to be deposited sooner. Furs have their felting property sometimes increased by the process of *carroting*, in which the action of heat is combined with that of sulphuric acid. For the chief employment of felted furs, see HAT MANUFACTURE.

Dressed furs are those to which the art of the *furrier* is applied for making muffs, boas, and fur-trimmings to garments. The fur is not separated from the pelt for these purposes; the two are used together; and the pelt is converted into a kind of leather to fit it for being so employed. The fur-hunters always exercise great care in drying the skins after removing them from the animals, seeing that any putrefactive action would ruin the fur. Before furs are made up, the skins undergo cleansing processes: They are steeped and scoured in a bath of bran, alum, and salt, to remove greasiness from the pelt; then in a bath of soap and soda, to remove oiliness from the fur. When thoroughly washed and dried, it is found that the pelt, by the action of the alum, has been converted into a kind of *tawed* or kid leather. The cleansed and dried skins are made into garments and trimmings by sewing through the pelt. The skins, however, are very irregular in shape, and often differ much in color in different parts; they require to be cut up into pieces, matched according to tint, and sewn together edge to edge. This requires much skill, especially where the furs are valuable. A fur garment or trimming, appearing to the eye as if it were one uniform piece, is thus generally made up of many curiously shaped pieces. The shaping for use, and the lining with silk and other materials, call for no description.—The great source of furs is the Hudson's Bay Territory (q.v.).

FUR.

In the United States the chief fur-bearing animals are the beaver, pine and stone martens, mink, lynx, badger, raccoon, silver, white, cross, blue, and red fox, seal, sea otter, Va. opossum, muskrat, bison, grizzly, and black bear, and gray wolf. The fur industry has been an important and growing one almost from the discovery of the continent. Early settlers traded with the Indians, several great trading companies were organized, and the Dutch East India Company had fur-trading posts at New York, Albany, on the Delaware river, and along the coast of Me. 1609-1684. The accession of the French to Canada led to a vast increase in the industry, to the erection of numerous forts and trading houses, and to the extension of operations from Hudson Bay to New Orleans. On the acquisition of the vast northern hunting grounds by the British, the Hudson's Bay Company secured a monopoly of the hunting, trading, and selling, and held it without much competition till 1799, when the Northwest Company became a rival, the American Fur Company was established 1808 by John Jacob Astor, who proposed making his headquarters at the mouth of the Columbia river and exporting his furs direct to China and India. In 1813 his company, whose name had been changed to the Pacific Fur Company, was sold out by his resident partner to the Northwest Company, and his subsequent operations were confined to the region e. of the Rocky mountains, with chief trading port at Mackinaw. In 1808 Auguste and Pierre Chouteau—who had been connected with the great fur depot of Laclede, Maxon & Co. established in St. Louis, 1763—formed the Missouri Fur Company, and operated it till its dissolution during the war with England 1812-15. The Rocky Mountain Fur Company was established at St. Louis, 1827, and the firm of Pierre Chouteau, Jr., & Co., 1834. These two corporations employed the greater part of the American trappers and hunters between the Miss. river, the great lakes, and the Pacific ocean for many years. The backbone of the great monopoly in the industry was broken when the charter and license of the consolidated Northwest and Hudson's Bay companies expired, 1859. The Russian-American Fur Company carried on an enormous business in seals in Alaska till its property and rights together with the territory were purchased by the U. S. govt. 1867; and since 1870 the seal fisheries of that locality have been entirely in the control of the Alaska Commercial Company of San Francisco, which operates under a contract with the general govt. by which the number of seals to be taken annually is limited to 100,000, and they males only. Large numbers of small fur-bearing animals are killed annually and their pelts are used for patching more valuable ones. Counterfeiting valuable skins is very common in all countries, by mechanical treatment of the fur itself, dyeing, etc.; but an expert furrier can always detect imposition. In purchasing valuable furs it is far better

to deal with a reputable merchant and pay an apparently high price than to be satisfied with a low-priced imposition. The catch of the chief fur-bearing animals, as well as the choice of fashion and cost of skins varies with the seasons; but the subjoined table gives a fair estimate of the most popular animals, the uses made of their skins, the number collected annually, and the market value of the dressed pelt.

Animal.	Uses of Pelt.	Average Annual Collection.	Value dressed Pelts.
Badger	Robes, military trappings	5,000	$.50-1.00
Bear, Black	" " caps, mats	15,000	20.-40.
" Brown	Muffs, ladies' trimmings	15,000	60.
Beaver	Great variety	200,000	1.- 5.
Buffalo	Lap-robes	100,000	3.-10.
Ermine (Alaska)	Royal state robes	1,500	1.- 3.
Fisher (Marten)	Linings, trimmings, robes	12,000	10.-20.
Fox, Silver	Muffs, boas, trimmings	1,000-2,000	50.-300.
" Cross	Lap-robes, trimmings	10,000	10.
" White	" "	65,000	2.50-5.
" Gray	Mats, muffs, trimmings	25,000	1.-10.
" Kitt	" " "	40,000	1.- 4.
" Red	Trimmings, linings	300,000	1.- 5.
" Blue	" "	6,000-7000	10.-20.
" Black (rare)	Muffs, boas, trimmings		400.-1000.
Lynx	Cloak facings, linings	20,000	3.- 5.
Marten, Pine	Coats, sacques	200,000	25.
" Stone	Muffs, boas, trimmings	150,000	1.- 5.
Mink	" collars	250,000	3.- 8.
Muskrat	Manufacture of hats	3,000,000	50.-1.50
Opossum	Mats, trimmings, caps	250,000	.05-.50
Otter, Land	Coats, Chinese and	4,000	10.-18.
" Sea	Russian Nobles		50.-400.
Raccoon	Coat linings, mfr. of hats	500,000	.50- 8.
Seal, Fur	Coats, sacques, caps, gloves	100,000	30.-45.
Skunk	Trimmings, muffs, boas	600,000	.50- 3.

FURBELOW, n. *fėr'bĕ-lō* [F. and Sp. *falbala;* Sp. *farfala,* a flounce: prov. F. *friboler,* to flutter: It. *farfalla,* a butterfly, from its fluttering flight—*lit.,* something that flaps to and fro]: padding; a puckered flounce for ornamenting various parts of the female dress.

FURBISH, v. *fer'bĭsh* [F. *fourbir,* to furbish; *fourbissant,* furbishing: It. *forbire,* to burnish]: to rub or scour to brightness; to polish. FUR'BISHING, imp. FUR'BISHED, pp. *-bĭsht.* FUR'BISHER, n. one who.

FURCATE, a. *fėr'kāt,* or FUR'CATED, a. *-kā-tĕd* [L. *furcātus*—from *furca,* a fork]: forked; branching like the prongs of a fork. FURCA'TION, n. *-kā'shŭn,* a branching like a fork.

FURCULUM, n. *fėr'kū-lŭm,* or FUR'CULA, n. *-lă* [L. dim. of *furca,* a fork]: a forked or V-shaped bone in the breast of a fowl, formed of the united clavicles; the merry-thought or wishbone; see FOURCHETTE.

FURFUR, n. *fėr'fėr* [L. *furfŭr,* bran: It. *forfora*], scales like bran; dandruff; scurf. FUR'FURA'CEOUS, a.

-ā'shŭs [L. *furfurācĕŭs*], scurfy or scaly; covered with a meal-like powder. FUR'FURA'TION, *n. -ā'shŭn*, the state of suffering from scurf or scaliness of the skin. FURFUR'AMIDE, n. *-ă-mĭd* [*furfurol*, and *amide*], solid combustible substance obtained from furfurol. FURFURINE, n. *fėr' fū-rĭn*, an isomeride of furfurol. FURFUROL, n. *fėr'fū-rŏl* [L. *olĕŭm*, oil]: volatile aromatic oil obtained from wheaten bran, also from sugar, starch, etc., by means of diluted sulphuric acid. When starch, sugar, or bran is acted on by dilute sulphuric acid and peroxide of manganese, the distillate contains not only Formic Acid (q.v.), but a small quantity of an essential oil, which, after being purified by redistillation, is colorless, has a fragrant odor somewhat resembling that of bitter almonds, and when dissolved in cold sulphuric acid, forms a beautiful purple liquid. This oil is *Furfurol* and its composition is represented by the formula $C_5H_4O_2$.—If furfurol be treated with ammonia, it is converted into *Furfuramide* ($C_{15}H_{12}N_2O_3$), which occurs in colorless crystals, insoluble in water, but soluble in alcohol, and perfectly neutral. If furfuramide is boiled with a solution of potash, it dissolves, its elements assume a new arrangement, and the solution on cooling deposits long silky needles of a powerfully alkaline base, *Furfurine*, which is isomeric with furfuramide. It is dissolved by dilute acids, and completely neutralizes them; and on adding ammonia to these solutions, the alkaloid is precipitated unchanged. It was discovered by the late Prof. Fownes; and as the first vegeto-alkali artificially formed, its production was regarded as a great step in organic chemistry.

FURFUR ALDEHYDE: sometimes called, incorrectly, furfural, $O\left\langle\begin{matrix}CH{=}{=}{=}CH\\ C(CHO):CH\end{matrix}\right.$; a colorless liquid with an aromatic odor, boiling at 162° C. It is formed by distilling straw, sugar, starch or other carbohydrates with dilute sulphuric or hydrochloric acid. It is of interest chemically partly because it is the starting point for the preparation of a large class of compounds and partly because it is probable that the vegetable materials mentioned above contain, in their molecules, complexes of atoms arranged in a very similar manner to those in furfur aldehyde itself. The quantity of furfur aldehyde which a given vegetable yields, when treated with acid as described above, often bears a distinct relationship to its value as a food material.

FURIDPUR, *fŭr-ēd-pôr'*, or DACCA JELALPUR, *dâ'kâ jĕl-al-pôr'*: district of Bengal Proper; n. lat. between 23° 3′ and 24° 5′ and e. long. between 89° 30′ and 90° 15′; 2,267 sq. m. It is everywhere intersected by branches or feeders of the Ganges, which, as the surface barely rises above the level of the sea, are all, unless in the dry season, navigable. The soil is in general rich. Pop. about 1,500,000.

FURIDPUR: town of Bengal Proper, cap. of the dist. of Furidpur; on the right bank of the Ganges, here called the Podda; lat. 23° 36′ n., and long. 89° 50′ e. It is 115 m. n.e. of Calcutta. Excepting the public establishments, which it possesses as cap. of the dist., the place is mainly a scattered series of native villages; and, in fact, it is notable chiefly as having at one time been a nest of river-pirates. Pop. about 8,600.

FU'RIES. See EUMENIDES.

FURIOUS, a. *fū'rĭ-ŭs* [F. *furieux*—from L. *furĭōsŭs*, mad, raging—from *furĭæ*, the three furies, rage: It. *furioso*]: impetuous; raging; transported by passion beyond reason. FU'RIOUSLY, ad. *-lĭ*. FU'RIOUSNESS, n. madness; rage. FURY, n. *fū'rĭ* [F. *furie*—from L. *furĭæ*, rage, fury]: rage; madness, impetuosity, a turbulent violent woman. FU'RIES, n. plu. *-rĭz*, in *heathen myth.*, the three avenging female deities (see EUMENIDES). FU-RIO'SO, ad. *-rĭ-ō'sō* [It.]: in *music*, furiously; vehemently. FURIOSANT, a. *-ōs'ant*, in *her.*, applied to a bull or other animal when represented in a rage; called also Rangant. FU'ROR, n. *-rŏr* [L.]: rage; fury.—SYN. of 'furious': violent; vehement; boisterous; fierce; turbulent; angry; mad; tumultuous; frenzied; frantic;—of 'fury': rage; anger; wrath; resentment; ire; madness; frenzy; turbulence; indignation; vehemence; violence; fierceness; a hag; a virago; a termagant.

FURL, v. *fėrl* [OF. *fardeler*, to truss or pack up]: to roll up in a long bundle, as a sail or flag; to draw up. FUR'LING, imp. FURLED, pp. *fėrld*.

FURLONG, n. *fėr'lŏng* [contr. from *furrowlong*, the length of a furrow]: a measure of length, being the eighth part of a mile, equals 220 yds.

FURLOUGH, n. *fėr'lō* [Dut. *verlof;* Dan. *forlov*, leave, permission]: among *mil. men*, leave of absence from duty: non-commissioned officers and private soldiers on furlough must be provided with a pass, else they are liable to be seized as deserters: V. to grant leave of absence. FUR'LOUGHING, imp. FUR'LOUGHED, pp. *-lōd*, having a furlough.

FURMER, n. *fėr-mer:* a flat chisel.

FURMITY, n. *fėr'mĭ-tĭ*, or FURMENTY, n. *fėr'mĕn-tĭ*, and FRU'MENTY, n. [see FRUMENTACEOUS]: a kind of pottage or gruel made from wheat, and flavored.

FURNACE, n. *fėr'nās* [F. *fournaise;* OF. *fornaise*, a furnace, an oven—from L. *fornācem*, an oven, a kiln—from *furnus*, an oven: It. *fornace*]: an inclosed fireplace for obtaining a high degree of heat, used for heating houses, and on a great scale in the manipulation of metals and liquids in the arts; *figuratively*, grievous afflictions. FURNACE, ELECTRIC. See ELECTRIC FURNACE.

FURNACE-PADS: the knees bolted on the shell of the fire-box, to place the weight of the boiler on the frame.

FURNACE-RINGS: the wrought-iron rings which connect the outside and inside sheets in the water space at the bottom of the furnace.

FURNARIUS, n. *fėr-nār'ĭ-ŭs* [L. a baker]: in *orinth.*, typical genus of *Furnarinæ*, a sub-family of *Certhidæ* (Creepers); small birds found in S. America and the W. Indies.

FURNEAUX, *fėr-nō':* group of islands in Bass's Strait between Australia and Tasmania; named from an English navigator, second in command on Cook's second voyage. Flinders Island, the principal one, is 46 m. long by 10 broad.

FUR'NESS, Horace Howard, American Shakespearian scholar and editor; son of William Henry Furness (1802-96) (q.v.): b. Philadelphia 1833, Nov. 2. He was graduated at Harvard in 1854; studied law, and was admitted to the bar in 1859. The honorary degree of Ph.D. was conferred on him by the University of Göttingen in recognition of his services to Shakespearian literature. He is the editor of the exhaustive *New Variorum Edition* of Shakespeare, the successive volumes of which appearing since 1871, include: *Romeo and Juliet* (1871); *Macbeth* (1873); *Hamlet* (2 vols. 1877); *Lear* (1880); *Othello* (1886); *Merchant of Venice* (1888); *As You Like It* (1890); *Tempest* (1892); *Midsummer Night's Dream* (1895); *Winter's Tale* (1898); *Twelfth Night* (1901).

FURNESS, William Henry, D.D.: Unitarian minister and author: b. Boston, 1802, Apr. 20; d. 1896, Jan. 30. He graduated at Harvard College 1820, studied theol. at the Cambridge Divinity School, and was pastor of the First Congl. Unit. Church, Philadelphia, 1825, Jan.—1875, when he retired from pastoral labor. He edited *The Diadem*, an annual, 1845-47, received the degree D.D. from Harvard College 1847, and that of doctor of letters from Columbia College 1887. He translated Schenkel's *Das Characterbild Jesu*, and Schiller's *Song of the Bell*, the latter being generally accepted as the best English version ever produced; and published *Remarks on the Four Gospels* (1835); *Jesus and His Biographers* (1838); *Domestic Worship*, prayers (1842); *A History of Jesus* (1850); *Thoughts on the Life and Character of Jesus of Nazareth* (1859); *The Veil partly Lifted and Jesus becoming Visible* (1864); *The Unconscious Truth of the Four Gospels* (1868); *Jesus* (1871); *The Power of Spirit Manifest in Jesus of Nazareth* (1877); *The Story of the Resurrection Told Once More* (1885); and *Verses, Translations, and Hymns* (1886).

FURNESS, William Henry, 1828-67, American artist, son of the preceding: b. Philadelphia, Pa., 1828, May 21; d. Cambridge, Mass., 1867, March 4. He very early made a reputation by the excellence of his crayon portraits, and having earned from the sale of these the means for foreign travel, studied art in Europe for two

years. On his return to America he established himself as a portrait painter in Philadelphia, and subsequently in Boston, and at the time of his death was one of the foremost portrait painters in the country. Among noted portraits by him are those of his father, Dr. Furness; Charles Sumner, and Lucretia Mott.

FURNIMENT, n. *fėr'nĭ-mĕnt* [F. *fourniment*—from It. *fornimento*]: in *OE.*, furniture.

FURNISH, v. *fėr'nĭsh* [F. *fournir*, to furnish; *fournissant*, furnishing: It. *fornire*, to store with: OH. Ger. *frumjan*, to provide, to procure—from *fruma*, profit, gain]: to supply with anything wanted or necessary; to fit up; to store. FUR'NISHING, imp.: ADJ. supplying furniture, etc. FUR'NISHED, pp. *-nĭsht*, supplied; in *her.*, applied to a horse bridled, saddled and completely caparisoned. FUR'NISHER, n. one who. FUR'NITURE, n. *-nĭ-tūr* or *-nĭ-chûr* [F. *fourniture*]: the necessary movables of a house; equipage; decoration; in *OE.*, supply.—SYN. of 'furnish': to supply; equip; provide; afford: fit out.

FURNITURE: formerly all the various movable appliances or articles in the interior of a house, now more commonly applied to articles of wood or metal. The ancient Egyptians aimed to variety rather than symmetry in the arrangement of their houses. They had chairs made of the finest woods in great variety of design, covered with rich cloths or skins, and inlaid with gold or ivory. They also used folding stools, sofas, couches, and carpets or rugs. Their tables were of variety of shapes and constructions. Bedsteads were made of wicker-work and sometimes of bronze. The forms of household articles of furniture found in or represented on Assyrian monuments and remains, show great artistic elaboration and a profusion of highly wrought ornament. The Assyrians were especially skilful in the chasing of metals, and they delighted in reproducing natural objects on their ornaments. The Greeks had couches covered with skins or drapery, on which several persons might lie with their bodies half raised; these were used at meal times by the men only, women and children sitting on seats; they had large armchairs with footstools, portable small chairs without arms, and stools with carved legs made to fold up.

Among the Romans, Greek art gained a predominant influence, and the conquerors of the world were at all times glad to employ natives of Greece to design and execute the works intended to display the opulence of their masters. On the ornaments of the *triclinia* or couches on which they reposed, immense sums were bestowed. They were often inlaid with precious materials, such as ivory, tortoise shell, gold and silver, and had ivory or metal feet. They consisted of a framework which was strung with girths, on which rested a mattress stuffed with straw, wool, or feathers, and covered

with rich drapery. The *lectus cubicularis*, or bed, was higher than the couch, but not unlike it. The tables were generally of costly foreign wood resting on frames of carved marble or an ivory column. The curule chairs, or seats of state of the patricians and magistrates, were wrought in ivory; and to form an estimate from the number of beautiful utensils in marble and bronze richly chased and inlaid with silver, that have been found in the ruins of a comparatively insignificant city, Pompeii, the wealth of the Romans in movable property of this nature must have been very great. The library first appears as a separate apartment in a Roman house; that discovered at Herculaneum was small, and lined with presses about the height of a man, in which the rolls of papyrus and parchment were kept. Still, according to modern ideas, the Roman rooms would seem rather bare of furniture. They had no writing tables or cabinets; couches, chairs, tables, and candelabra comprised the whole of the furniture with the exception now and then of a water clock, or a chafing dish.

Among European states from 500 A.D. to 1500, the ecclesiastical style prevailed in furniture as in every other species of art, attaining its greatest eminence in the decorated Gothic of the 14th century. Articles of furniture previous to 1500 are very rare. For three centuries after the Conquest domestic furniture was very scanty. The hall was furnished with tables and benches, the furniture of a bedroom consisted of little more than a bed and a chest. Chairs were large and cumbrous, and were usually fixtures; wooden forms, sometimes with black rails, being placed against the walls. The furniture of the dining-room was very limited. Boards on trestles were in general use as tables. In the 14th and 15th centuries remarkable progress was made and a considerable degree of splendor in furniture was attained. Defense began to be not the only object studied in the construction of buildings. The Gothic paneling of the carved bedsteads, chairs, screens, etc., was dazzling with scarlet, blue, and gold, and costly embroidered hangings and curtains heavy with heraldic symbolism, cabinets, reading-desks, prie-dieus, ivory and enameled coffers, fire dogs, or andirons elaborately chased and gilded, began to appear.

The progress of this decorative style was suddenly arrested by the 'Renaissance,' or revival of ancient classical art and literature, of which Italy was the earliest seat, and from whence the impulse was given that communicated itself speedily to the rest of Europe. A genuine and self-evolved style instantly went out of fashion, and was discarded for an imitation and counterfeit one based on the copying of understood classic models which were applied without consideration to the most incongruous objects. The classical temple was the dominant idea in the manufacture of furniture as well as in the construction of a palace or a cathedral, and columns were con-

sidered as necessary in one species of art as in the other. All the architectural details of Roman buildings were then applied to furniture; the lions, griffins, chimeras, etc., of the temple frieze encumbered the stately pillars of the Italian palaces, and caryatides and Roman trophies replaced the patron saint and the crucifix. With all its absurdities, it must be noted that this style was in the hands of great men, and their productions display a boldness and vigor of line, and a mastery over human and animal forms that give dignity to a licentious freedom of design in which all appropriateness is forgotten. Specimens of the Renaissance are still met with, though daily increasing in value. Gothic art never recovered its lost ground.

With various modifications the Renaissance style continued dominant for nearly two centuries. In England it degenerated into positive ugliness, the furniture of the time of Elizabeth and James I. having very little to recommend it in tasteful design. It is distinguished by a mixture of overwrought heavy moulding, combined with thin spindly columns, twisted legs, and other inelegant characteristics. Magnificence is sometimes attempted in the value of the material, as in the famous set of chamber furniture in chased silver executed for a royal visit at Knowle Park, the seat of the dukes of Dorset in Kent. It was succeeded by the style named after the French monarch, its patron and encourager, Louis XIV.

The modern predominance of France in the construction of furniture is owing to the minister Colbert. He it was who brought together the best workmen of Europe, and by an edict of the year 1667 established the French royal manufactory of furniture. The new style which the productions of this establishment assumed appears to have been worked out undesignedly, and, like every such successful phase of art, was the genuine product of circumstances. Novelty and magnificence seem to have been the great features aimed at; these were sought by varied treatment of surface in cabinet furniture (as inlays of metals, ivory, enamels, porcelain tablets, tortoise shell, etc.), and by an incrustation of broken scroll panel work, which hid the real constructive forms and frittered away the graceful outlines of the Renaissance into a confused and unsymmetrical mass. Under Louis XV. the same school of art continued, and it received new elaboration under the successors of Boule, Riesner, and Gouthier; their works are known to connoisseurs as articles of vertu by the respective styles of each master, and fine specimens bring almost fabulous prices. Probably more of this class of furniture is to be found in Great Britain than in all the rest of Europe, a great change of owners having been brought about by the French Revolution. While the splendid extravagances of Louiv XIV. were holding sway in France. the prevailing taste in England seems

rather to have been modified by the fashion introduced from Holland by William III. The native woods, oak or wainscot, chestnut, etc., were about this time superseded for furniture by the dark and heavy West India mahogany, the invariable material of the ill-designed and awkward furniture familiar to us in the immortal designs of Hogarth. A better style based on that of France was introduced by Chippendale, but a severer and more artistic taste was displayed by the designs of Heppelwhite and Sheraton. In the latter part of the reign of Louis XVI. another change is apparent in French furniture. Greece and Rome were looked up to as standards of correctness in furniture as well as in politics. But instead of impressing their own genius on designs inspired by ancient models as did the great artists of the Renaissance, the authors of this revival were too often content with frigid imitation. The classical style did not long hold sway, and since that time the practice of both France and England (and with them the rest of Europe) has been purely eclectic. At present designs after the best work of the older makers are much in favor in both Europe and America.

Many of the numerous articles of furniture manufactured are distinctly American. The bureau, the rocking-chair, the folding-bed, the chiffonier, as now made with toilet, and in general most of the combination pieces of furniture made with a view of economizing space in apartments in large cities, are of this class. The American bureau is a combination of the old chest of drawers and the dressing-table, having the drawer-room of the one and the swinging mirror and table-top of the other. This has been imitated in Europe to a limited extent, in the production of what is known as the English dressing-table. As made in this country, the bureau is one of the most practical pieces of furniture used. The rocking-chair, almost entirely unknown in Europe, is found in every home in this country, yet it is difficult to ascertain when it was first put in use. We do not find any mention of it in the descriptions of articles of furniture in the 18th century. The first patent issued for improvements in rocking-chairs is dated as far back as 1830. The folding-bed, in the shape of a sofa, with a box-seat for bedding, has been used in Europe for over a hundred years, but America claims the folding-bed in other forms, such as the wardrobe, the cabinet, the mantel, and the combination; some of these were made as early as 1847. The demand for folding-beds, which reached its climax a few years ago, is now showing a material decline.

The woods used in the manufacture of furniture are varied, and subject to frequent changes. Early in the century, mahogany, maple, and black walnut were in favor; then cherry and ash became fashionable; toward 1880, oak, so long forgotten, took a prominent place. At the present time black walnut is almost entirely out of use. Oak has kept its popularity for the hall, the

library, and the dining-room. Mahogany, curly birch, and maple are still extensively used; all of them for the bedroom, and mahogany for the dining-room and the drawing-room in the better grades of furniture. The changes in furniture covering have been more frequent and radical than those in the woods. Haircloth and other coverings in use 30 years ago have been superseded by materials more varied in texture and coloring. Their variety is almost endless, and they show, perhaps as much as anything else, the advance that art as applied to furniture has made in this country.

FURNIVALL, *fėr'nĭ-val,* FREDERICK JAMES: b. 1825, Feb. 4, at Egham, Surrey, England: laborious and enthusiastic student of early English. He was educated at University College, London, and Trinity Hall, Cambridge, where he took his degree 1846. In early life he associated himself in philanthropic work with Frederick D. Maurice, and taught in his Working Men's College every term for ten years. He has devoted himself to English philology, and with characteristic energy has founded, for the publication of texts, 'The Early English Text Society,' 1864 (with the 'Extra Series' 1867); 'The Chaucer Society' (1868); 'The Ballad Society' (1868); and the 'New Shakespeare Society' (1874); and more recently has been active in starting 'The Browning Society' (1881), and 'The Wiclif Society' (1882). He has been honorary sec. of the Philological Soc. since 1854, and he edited for some years the Society's great English Dictionary, the first part of which was published under the supervision of Dr. Murray 1884. Through his societies, he has raised and expended more than £20,000 in printing early MSS. and rare books, and has thus placed in the hands of thousands of students cheap and accurate texts. He has personally edited many works, chiefly through the medium of some one of the above societies; the most important being *Saint Graal,* the History of the Holy Grail, in English verse, by Henry Lonelich (1440), with its original, the Old French prose *Histoire del Saint Graal* (2 vols. 1861-63); Roberde of Brunne's *Handlyng Synne* (1862); Walter Map's *Queste del Saint Graal* (1864); *Political, Religious, and Love Poems* (1866); Bp. Percy's *Folio MS. of Ballads and Romances,* ed. jointly with J. W. Hales (3 vols. 1867-8); *Ballads from Manuscripts on the Condition of Tudor England,* 1520-50 (2 vols. 1868-72); Caxton's *Book of Curteseye* (1868). His most valuable work has been his splendid edition of Chaucer's *Canterbury Tales:* 'A Six-Text Print of Chaucer's Canterbury Tales' (7 parts 1868-75), an exact reprint of six of the seven most important MSS. (the seventh having already been edited by Dr. Morris). This work has given a new impulse to English scholarship, and will always remain a monument of the noble and patient enthusiasm of its editor. For Chaucer scholars he has edited further a 'Parallel Edition of Chaucer's Minor Poems,' and a 'Parallel Text Edition of Chaucer's *Troilus and Creseyde.*

FUROLE, n. *fû-rōl'* [F.]: meteoric light sometimes seen on the sail-yards of ships at night.

FUROR. See under FURIOUS.

FURRED, FURRIER, etc. See under FUR.

FURROW, n. *fŭr'rō* [AS. *furh;* Ger. *furche*, a furrow: comp. L. *porca*, a ridge between two furrows]: the small trench or channel made by a plow; any narrow groove or channel, a wrinkle: V. to form furrows in; to groove; to wrinkle. FUR'ROWING, imp. FUR'ROWED, pp. *-rōd*, having channels or ridges lengthwise.

FURRY. See under FUR.

FURS, in Heraldry: various furs used in coat-armor, as well as in trimming and lining the robes of knights and nobles, and the mantles represented as surrounding their shields. This use arose from the fact that shields were often covered with the skins of wild animals, on which the fur was left. The principal heraldic furs are —1. Ermine of which the field is white, and the spots black; 2. Ermines of which the fields are black, and the spots white; 3. Erminois, which has the field gold, with black spots; 4. Vair, which consisted of pieces of the shape of little glass pot (Fr. *verres*, of which the word is a corrupt spelling). It is said that the furriers used such glasses to whiten furs in, and because they were commonly of an azure (blue) color, the fur in question come to be blazoned *argent* and *azure;* while counter-vair, in which the cups are represented as placed base against base, in place of edge to base, as in vair was *or* and *azure*. 5. Potent and counter potent, which are supposed to resemble the heads of crutches, placed differently, but having the same tinctures—viz., azure and argent.

FÜRST, *fürst*, JULIUS: orientalist: 1805, May 12—1873; b. Zerkowa, in the grand-duchy of Posen, Prussia, where his father, a Jew, was lecturer on circumcision in the synagogue. Fürst was educated for the rabbinical profession, and very early showed remarkable power of acquiring knowledge. He studied at Berlin, where the German philosophy made sad havoc of his previous convictions. The conflict in his mind between science and rabbinical lore ended, 1829, in the defeat of the latter, and Fürst immediately went to Breslau, where he continued his oriental, theological, and antiquarian studies, which were completed at Halle 1831, under Gesenius, Wegscheider, and Tholuck. In 1833 he went to Leipsic, where he became prof. in the univ. 1864. Among his numerous and valuable writings are *Lehrgebäude der Aramäischen Idiome* (System of Aramaic Idioms, Leip. 1835), a work which brought the Semitic languages within the sphere of comparative grammar, then in its infancy; and which, besides, sought to establish a system of analytico-historic investigation in regard to these languages themselves; *Perlensehnüre Aramäischer Gnomen*

und Lieder (Pearl-strings of Aramaic Gnomes and Songs, Leip. 1836), with elucidations and glossary; *Concordantiæ Librorum Sacrorum Vcteris Testamenti Hebraice et Chaldaice* (Concordances of the Sacred Books of the Old Testament in Hebrew and Chaldee, Leip. 1837-40), a work of indefatigable industry and careful research, which has obtained for its author great reputation in Germany and other countries; *Ari Nohem* (Leip. 1840), polemical treatise on the genuineness of the Sohar and the worth of the Cabbala; *Die Sprüche der Väter* (The Sayings of the Fathers, Leip. 1839); *Die Israelitische Bibel* (The Hebrew Bible, Berlin 1838), translated into German from the original, by himself in conjunction with other scholars; *Der Orient; Berichte, Studien und Kritiken für Jüdische Geschichte und Literatur* (The East; Notices, Studies, and Criticisms in connection with Jewish History and Literature, Leip. 1840); *Die Jüdischen Religionsphilosophen des Mittelalters* (The Jewish Religious Philosophers of the Middle Ages, Leip. 1845); *Geschichte der Juden in Asien* (History of the Jews in Asia, Leip. 1849); *Bibliotheca Judaica* (1849-53); *Hebräisches und Chaldäisches Handwörterbuch* (Hebrew and Chaldee Manual, Leip. 1851-54; and an edition of Winer's *Chaldee Reading Book* (1864).

FURST, William, American composer and conductor: b. Baltimore, Md., 1852, March 25. He studied music in his native town and at the age of 14 was a church organist. His comic opera *Electric Light* was produced and conducted by him in 1878 and for the five seasons following he received engagements as conductor of opera. He became musical director of the Tivoli Theatre, San Francisco, in 1884. His opera *She* ran for nine weeks there, and was produced for two seasons in New York. His chief productions are: *Theodora* (1888); *The Isle of Champagne* (1891); *Honeymooners* (1893); *Princess Nicotine* (1893); *The Little Trooper* (1894); *Ghismonda* (1894); *The Merry World* (1895).

FÜRTH, *fürt:* flourishing manufacturing town of Bavaria, in Middle Franconia, at confluence of the Rednitz and the Pegnitz, about 5 m. n.w. of Nürnberg, with which it is connected by a railway laid out in 1835, the first completed in Germany. Fürth has numerous churches, synagogues, a town-hall, theatre, etc. It is the most industrious and most prosperous manufacturing town in Bavaria; its mirrors, chandeliers, snuff-boxes, lead-pencils, its brass and wood wares, and its articles of dress are famous. The making of metallic leaf, and the manufacture of articles in bronze, are most important branches of industry. Fürth produces also pinchbeck rings, watch-keys, brass nails, spectacles, and optical instruments in great abundance. An annual fair, lasting 14 days, takes place at Michaelmas. Fürth appears in history first about the beginning of the 10th c., when it belonged to the archbishops of Bamberg. Sub-

sequently it acknowledged the authority of Burgrafs of Nuremberg. In 1634, during the Thirty Years' War, the Austrian Croats burned it to the ground. In 1680 a great fire almost laid it in ashes again. It began to attain importance as a seat of manufactures in the latter half of the last century. Pop. (1900) 54,144.

FURTHER, a. *fėr'thėr* [AS. forth, forward, onward: Dut. *voorder;* Ger. *vorder*, further, more onward (see FORTH): comp. O.H.G. *furdir;* Ger. *fürder*, onward]: more distant; beyond this; additional; is now used as the compar. of *far*, but erroneously: AD. to a greater distance: V. to help forward; to promote. FUR'THERING, imp. promoting; advancing. FUR'THERED, pp. *-thėrd.* FUR'THERANCE, n. *-thėr-ăns*, a helping forward. FUR'THERMORE, ad. moreover; besides. FUR'THERMOST, a. most remote. FURTHEST, a. *fėr-thĕst*, most advanced in time or place: AD. at the greatest distance. *Note.*—*farther* is restricted by many in its application to distance, and *further* to quantity and degree, etc. Skeat affirms that *further* is the comparative of AS. *fore*, before. It is a development of Dut. *voor;* Eng. *fore*—see Wedgwood under *forth.*

FURTIVE, a. *fėr'tĭv* [F. *furtif*—from L. *furtīvŭs*, stolen—from *fur*, a thief; It. *furtivo*]: stealthy, as furtive glances. FUR'TIVELY, ad. *-lĭ*, by stealth.

FURUNCULUS, n. *fėr-ŭng'kū-lŭs* [L. *furun'cŭlus*, a petty thief, a boil—from *fūr* a thief]: a boil or small sore having a central core, and suppurating imperfectly. FURUNCULAR, a. *fėr-ŭng'kū-lėr*, like a furunculus.

FU'RY AND HEC'LA STRAIT: water-passage separating, in lat. 70° n., and long. from 82° to 86° w., Melville Peninsula on the s. from Cockburn Island on the n., and connecting Fox's Channel on the e. with the Gulf of Boothia on the w.; lat. 70° n., long. 82°-86° w. It is of no value as a means of communication, nor is ever likely to be so, its w. entrance having been ascertained by Captain Parry who discovered it on his second voyage, to be impenetrably closed from shore to shore by the accumulated ices of many years. It is traversed from w. to e. by a strong current, which passes down Fox's Channel into Hudson's Strait.

FURZE, n. *fėrz* [AS. *fyrs*, furze: properly *firs*, from the prickly leaves: comp. Gael. *preas*, a brier, a bush]: (*ulex*). FURZY, a. *fėr'zĭ*, full of furze.— *Furze* is a genus of plants of nat. ord. *Leguminosœ*, sub-ord. *Papilionaceœ*, distinguished by a two-leaved calyx with a small scale or bractea on each side at the base, stamens all united by their filaments, and a turgid pod scarcely longer than the calyx. The COMMON FURZE (*U. Europœus*), called also WHIN and GORSE, is a prickly shrub two or three ft. high, extremely branched; the branches green, striated, and terminating in spines; the leaves few and lanceolate; the flowers numerous, solitary, and yellow. It is common in many s. parts of Europe and in Britain,

though it often suffers from severe winters; whereas in mild seasons its flowers may be seen all winter, so that there is an old proverb, 'Love is out of season when the furze is out of blossom.' It is scarcely known in n. parts of Europe; and Linnæus is said to have burst into exclamations of delight when he first saw a common covered with furze bushes glowing in the profusion of their rich golden flowers. Furze is sometimes planted for hedges, but is not well suited for the purpose, occupying great breadth of ground, and not readily acquiring sufficient strength; besides, it does not, when cut, tend to acquire a denser habit. It is useful as affording winter food for sheep, and on this account is burned down to the ground by sheep farmers when its stems become too high and woody, so that a supply of green succulent shoots may be secured. In some parts of Wales, furze, chopped and bruised, forms the principal part of the winter fodder of horses. In some places, it is sown to yield green food for sheep or other animals, but is preferable to other green crops only on dry sandy soils where they could not be advantageously cultivated. It is most extensively cultivated in Flanders. It is chopped and bruised by means of a mallet, one end of which is armed with knife-blades; or by means of a simple machine, called a gorse-mill.—A double-flowering variety is common in gardens. A very beautiful variety, called IRISH FURZE, originally found in Ireland (*U. strictus* of some botanists), is remarkable for dense, compact, and erect branches. A dwarf kind of furze (*U. nanus*) occurs in some places, and is perhaps also a mere variety; if so, there is only one species known.

In fox-hunting countries, furze is encouraged on account of the excellent *cover* it affords. It is also a favorite cover for rabbits.

FU-SAN: seaport of Korea, province of Kyong'-Sang-do; lat. 35° 6′ n., long. 129° 1′ w.; on Broughton Strait, n.w. of the island of Tsu-Shima. It is the largest city on the Japan Sea coast of Korea s. of Won-San, on Broughton Bay. Near it are the cities of Chhang-won and Tong nai. It is in a mountainous region, chiefly watered by the Nak-tong river. Though in Korea it has been recognized as an important Japanese seaport for nearly 300 years, in which no Koreans resided. Occasionally Chinese merchants settled there and undertook trade with the natives in the interior, but the Japanese authorities expelled them on short notice, and it was not till the treaty of 1876 that the restrictions on foreigners in Fu-san were removed. See KOREA.

FUSANUS, n. *fūz'a-nŭs* [mod. L.—from F. *fusain*, a spindle-tree]; genus of *Santalaceæ* (Sandalworts). *F. acummatus*, the Quandang Nut, is as agreeable to the Australians as the almonds are to us.

FUSARIUM, n. *fū-zär'ĭ-ŭm:* genus of fungi. Some species are parasitic on rye and the mulberry.

FUSARO, *fô-sâ'rō*, LAKE OF: small lake of s. Italy, province of Naples, 11 m. w. from Naples, on the Peninsula of Baiæ. It is not far from the site of the anc. Cumæ, of which it is supposed to have been the port. Numerous remains of massive buildings, villas, and tombs are in the neighborhood. At the s. extremity of the lake is a canal of Roman construction, communicating with the sea, now known as the *Foce del Fusaro*. The water of the lake is brackish, more salt than fresh. The lake is famous for its oysters, cultivated here (see OYSTER) since the times of the ancient Romans. They are larger and of finer flavor than those of the Bay of Naples. The lake is supposed to be the crater of an extinct volcano; and, 1838, great quantities of noxious gases were emitted by which the oysters were killed. The lake of Fusaro received from the ancients the name *Acherusia Palus*, probably bestowed on it first by the Greeks of Cumæ, because of its proximity to Avernus, and its crater-like character. In later times of the Roman empire its banks were adorned with the villas of wealthy Romans.

FUSAROLE, or FUSAROL, n. *fūz'a-rōl* [L. *fusus*, a spindle; the shaft of a column]: in *architecture*, molding or ornament immediately under the echinus in the Doric, Ionic, and composite capitals; shaft of a column, pilaster, or pillar, or that part between shaft and capital.

FUSCOUS, a. *fŭs'kŭs* [L. *fuscŭs*, dark: It. *fosco*]: in *bot.*, dark; dusky; brown. FUSCESCENT, a. *fū-sĕs'ĕnt*, tending to a dark brown.

FUSE, v. *fūz* [L. *fūsŭs*, poured or spread out: It. *fuso*]: to melt or liquefy by heat; to be melted. FU'SING, imp. (see FUSING AND FREEZING POINTS). FUSED, pp. a. *fūzd*, melted. FUSION, n. *fū'zhŭn*, the act of melting; the state of being dissolved or melted by heat; the union or blending together as if melted. FU'SIBLE, a. *-zĭ-bl*, that may be melted. FU'SIBIL'ITY, n. *bĭl'ĭ-tĭ*, the quality of being able to be melted. With few exceptions, all solids which can bear a high temperature without undergoing chemical change may be melted. Many substances popularly regarded as infusible, e.g. platinum and flint, readily fuse before the oxyhydrogen blow-pipe, or between the poles of a powerful galvanic battery; even carbon has been partially fused by the last-named means. There are many substances which cannot be melted because they are decomposed by the action of heat. Thus, wood and many other organic compounds are decomposed into certain gases, which escape, and into carbon and fixed salts, which are left. Similarly, carbonate of lime (chalk) is decomposed into carbonic acid gas and lime at a temperature below its fusing-point. If, however, we prevent the gas from escaping by confining the carbonate of lime in a hermetically closed gun-barrel, it can be melted at a high furnace-heat. A table of 'The Order of Fusibility of the Metals' is given by Miller in his *Elcmcnts of Chemistry*, 2d ed. II. 294. FUSIBLE CAL-

CULUS, in *med.*, form of stone, or urinary calculus, white, smooth, soft, and brittle. It fuses before the blow-pipe; and contains ammonia, calcium phosphate, magnesium phosphate, and animal matter. FUSIBLE METAL, any alloy, or metallic mixture, which melts at a comparatively low temperature. Fusible metals are used in the arts for many purposes. Automatic sprinklers, for example, are capped with alloys of this sort, which are chosen so as to have melting points that are higher than any temperature that would normally occur in the room that is to be protected. If a fire breaks out, however, the abnormal rise of temperature so produced causes them to melt, the water in the sprinkler pipes being thereby released, and the fire is extinguished. Fusible metals have also been used quite generally in the manufacture of 'fusible plugs,' for the protection of steam boilers; such plugs being screwed into the boiler at the height which is considered to be the lowest limit to which the water level in the boiler can be allowed to descend with safety. So long as the inner end of the plug is covered with water, the plug itself is thereby kept too cool to melt under the influence of the furnace gases; but when the protecting action of the water is removed by the water level descending below the safety limit, the hot furnace gases melt the material of the plug, and the steam in the boiler escapes.

FUSE, or FUZE, n. *fūz*, or FUSEE, n. *fū-zē'* [F. *fusée*, a spindleful of thread, a squib, a firework of sputtering gunpowder]: a tube of wood or metal, perforated down the side with a vertical row of holes, and used for firing shells. FUSEE, n. *fū-zē'*, a match, cigar-light.

FUSE, for exploding shells, or in blasting, is a tube filled with a composition of nitre, sulphur, and gunpowder, which will burn gradually. The distance between each hole representing a second, the range and time of flight are computed, and that hole is left open which will communicate the fire in the fuse to the loaded shell at the moment the latter touches the ground after being discharged. Of course, when combustion reaches this aperture, the shell is burst by the explosion of the contained gunpowder, and scattered around in numerous fragments. Fuses constructed on a similar principle are used in exploding military mines (see MINES, MILITARY). In the United States, the forms of fuse mostly employed are known as time, safe, delay, percussion, concussion, combination, contact, and electrical; and nearly all bear the name of the inventor. The methods of their construction and application differ in each case. Since the close of the civil war, gunpowder has been largely superseded by nitro-glycerine, dynamite, and other newly invented explosives, and the electric current has taken the place of the old train-fuse. These agencies have been employed in some of the greatest engineering works, both mining and military. The inventive genius of the country has been active in providing new devices for

exploders, new kinds of explosives, and new methods of discharge; and during 1888-9, these efforts were greatly stimulated by the depts. of war and the navy under the sanction of congress. As the little monitor of 1861 revolutionized the war vessels of the world, the official tests of new inventions of fuse fulminators, explosives, shells and cannon, promise material changes in the modern system of warfare. Recent inventions include new methods of ignition; an explosive more violent than dynamite, yet absolutely harmless to handle; a series of cannon arranged on an enormous wheel and discharged by electricity as the wheel revolves; a self-submerging ram and torpedo-boat using dynamite that is exploded on contact with an enemy or at any requisite distance by electricity or time fuse; and the Zalinski 15-inch gun invented for the new cruiser *Vesuvius*, which has exceeded the requirements of the official test (1889, Jan.-Feb.) in throwing projectiles filled with explosive gelatine and dynamite, that are made to explode before, on, or after striking the water or an object aimed at, according to the will of the gunner. These projectiles are used with and without a delay-fuse, and are propelled by air pressure alone.

FUSE, Electric. See Electrical Protective Devises.

FUSEE, n. *fū-zē'* [F. *fuseau*, a spindle; *fusée*, the barrel of a crane: L. *fūsŭs*, a spindle (see Fuse)]: spirally grooved cone or conical part of a clock round which is wound the chain attached to a box rotating through the force of a coiled spring in it; as the spring uncoils, the box revolves; and the cone being pyramidal the leverage grows longer at the other end of the chain in proportion as the spring uncoils—thus counter-acting the loss of power, and keeping the driving force uniform. Fusiform, a. *fū'zĭ-fawrm* [L. *forma*, shape]: in *bot.*, spindle-shaped; tapering like the root of a carrot.

FUSELI, *fū'zĕh-lē*, Henry: 1742—1825, Apr. 16; b. Zurich, Switzerland; second son of John Caspar Fuseli or Fuessli, portrait-painter, and author of *Lives of the Swiss Painters*. He studied in his native town and at Berlin, travelled with Lavater 1761, and then went to England, where, by Reynolds' advice, he applied himself to art, and studied in Italy eight years. In 1778, he returned to England. In 1790, was elected a member of the Royal Acad., where, nine years later, he became prof. of painting. He died at Putney Hill, near London, and was buried beside his friend Sir Joshua Reynolds, in St. Paul's. His most remarkable works are *The Ghost of Dion*, from Plutarch; *Lady Macbeth; Hercules and the Horses of Diomedes;* and *Milton's Gallery*, comprising 47 designs from *Paradise Lost*. Fuseli's imagination was bold, but coarse; he had more genius than art; and his execution was often spasmodic. His art-criticism, however, ranks among the best in the language. His literary works, with a narrative of his life, were published by Knowles (3 vols. London 1831).

FUSEL, *fū'zĕl* (or FOU'SEL) OIL: known also as POTATO SPIRIT [Bav. *fusel*, bad brandy; *fuseln*, to trifle]: a frequent impurity in spirits distilled from fermented potatoes, barley, rye, etc., to which it communicates a peculiar and offensive odor and taste, and an unwholesome property. Being less volatile than either alcohol or water, it accumulates in the last portions of the distilled liquor. It consists of an indefinite and variable mixture of amyl alcohol with certain other alcohols and ethers, and certain organic acids and their esters. Fusel oil always contains amyl alcohol, and usually contains butyl and propyl alcohols also. It is a colorless limpid fluid with a persistent and oppressive odor and a burning taste. It is only sparingly soluble in water, but may be mixed with alcohol, ether, and the essential oils in all proportions. Any spirit which produces a milky appearance when mixed with four or five times its volume of water, may be suspected to contain it.

FUSIBILITY, FUSIBLE. See under FUSE.

FUSIFORM, a. See under FUSEE.

FUSIL, n. *fū'zĭl* [F. *fusil;* It. *focile*, a fire-steel for a tinder-box—from mid. L. *focus*, fire]: a light musket or firelock. FUSILEER, or FUSILIER, n. *fū'zĭ-lēr'* [F. *fusilier*]: one of the soldiers of a foot regiment originally armed with a fusil: now all foot-soldiers carry the improved rifle, so that *fusiliers* is (in some armies) a mere title of honor conferred upon certain infantry regiments as a reward for distinguished conduct, a fusilier regiment being supposed to hold a high place in relation to other regiments. FUSILADE, n. *fū'zĭl-ād'* [F. *fusillade*, a shooting]: discharges of firearms in military exercises.

FUSIL, a. *fū'zĭl* [L. *fūsus*, poured out, melted]: in *OE.*, fused; capable of being melted.

FUSIL, n. *fū'zĭl* [from a supposed mid. L. *fusillus*—from L. *fūsus*, a spindle]: a spindle in heraldry, represented as longer and more acute than a Lozenge (q.v.).

FUSING (or FUSION) DISK: disk of steel used for cutting cold iron or steel bars; the invention of Jacob Reese, of Pittsburgh, Penn. It had long been known that a rapidly rotating disk of steel or iron would cut through the hardest steel if its periphery was held in contact therewith. Mr. Reese modified its action. He adopted such a velocity of rotation and size, that a peripheral speed of 2,500 ft. per second was secured, and he caused the bar which is to be cut, and which is held in front of the disk's edge, to rotate about 200 revolutions per minute in the same direction as the saw. Thus the two peripheries of saw and bar move in opposite directions. The bar is quickly cut off, a 1⅝ round bar being severed in from 2 to 10 seconds. The disk is $\frac{3}{16}$ inch thick and is toothless; it makes a cut or kerf ⅝ inch wide. The saw remains cool, and the bar becomes heated. Very extraordinary claims have been made as regards

its mode of action. It is said that the disk and iron do not touch, and that the cut is made without any contact or friction between the solids. The debris is said to be fused metallic iron, and not magnetic oxide, if the bar revolves; if the bar is stationary, it is said to be magnetic oxide. Probably, however, it is by frictional contact that the cutting is effected.

FU'SING AND FREEZ'ING POINTS: terms applied to the temperature at which solids assume the liquid form and liquids become solid. The following table gives some determinations at the best approximate of the fusing-point:

Mercury	—39°	Alloy (3Sn,2Pb)	333°
Oil of vitriol	—30°	Tin	446°
Bromine	— 9°·5	Bismuth	507°
Oil of turpentine	14°	Nitrate of soda	591°
Ice	32°	Lead	620°
Lard	91°	Nitrate of potash	642°
Phosphorus	111°·5	Zinc	773°
Potassium	136°	Antimony (about)	900°
Yellow wax	143°·6	Silver	1773°
Stearic acid	156°	Copper	1996°
Sodium	207°·7	Gold	2016°
Fusible metal (5Pb,3Sn,8Bi)	212°	Cast-iron	2786°
Iodine	225°	Wrought-iron	2912°
Sulphur	239°	Platinum	3226°
Alloy (1Sn,2Bi)	286°		

It is evident from this table that alloys may have a fusing-point far below that of any of the metals which enter into their composition. Similarly, mixtures of various silicates fuse at a temperature far below that required to melt any one of them; and the same remark applies to mixtures of various chlorides, carbonates, etc.

Most solids, when heated to their fusing-point, change at once into perfect liquids; but some, e.g. platinum, iron, glass, phosphoric acid, the resins, and many others, pass through an intermediate pasty condition before they attain perfect fluidity, and in these cases it is difficult, if not impossible, to determine the exact fusing-point. This intermediate condition is termed *vitreous fusion*, because it is a characteristic property of glass. It is in this intermediate state that glass is worked, and iron and platinum forged.

As a general rule, the freezing-point is the same as the fusing-point—that is to say, if a substance in the liquid form be cooled below the fusing-point, it again becomes solid. But there are cases in which a liquid can be cooled several degrees below its fusing-point; thus, by keeping water perfectly still, it can be cooled to 5°, or even 1°·4 before it freezes. If, however, we drop a solid body into water in this condition, or if we shake the vessel containing it, congelation begins at once, and the temperature rises to 32°. This phenomenon is exhibited to a still greater degree in viscid fluids, like the oils. It is well known that the freezing-point of water is depressed by the presence of salts. Thus, sea-water freezes at about 26°·6, and a saturated solution of common salt must be

cooled as low as 4° before freezing. Despretz has given the freezing-points of various saline solutions at different degrees of concentration, in Vol. IV of the *Comptes Rendus*, p. 435.

FUSION, in psychology, the feeling-together of sensations or other mental elements which have separate origins; consciousness in which parts are not discriminated. Thus the taste of an orange is experienced as a unit, though it can be shown to be composed of the taste qualities, sweet and acid, *plus* the peculiar flavor which is not a taste but an odor, and which is cut out by occluding the nose. In hearing, the overtones are fused with the fundamental tone, and can be discriminated only with special practise. Some psychologists hold that the elements exist in consciousness and are then fused, while others insist that the elements do not have a place in consciousness, but only in the physiological processes connected therewith.

FUSISPORIUM, n. *fū-sĭ-spōr'ĭ-ŭm* [L. *fusus*, extended, broad; Gr. *sporos*, seed]: in *bot.*, genus of hyphomycetous fungi, forming first a mildew, and next an extensive gelatinous stratum, with spindle-shaped spores.

FUSIYAMA. See FUJI-YAMA.

FUSS, n. *fŭs* [Swiss, *pfusen*, to make a fizzing noise: Sw. *fias*, stir: comp. Gael. *fuis*, active, busy]: a bustle in a small matter; much ado about trifles. FUS'SY, a. *-sĭ*, troublesome and bustling about a small matter. FUS'SILY, ad. *-lĭ*, in a bustling manner. FUSSINESS, n. *fŭs'sĭ-nĕs*, the state of being fussy. *Note.*—Skeat cites Icel. *fúss*, eager for: OH. Ger. *funs*, ready, willing.

FUST, n. *fŭst* [OF. *fust*, F. *fut*, a staff of wood, a cask —from L. *fustem*, a thick knobbed staff; in *arch.*, the shaft of a column from the astragal to the capital.

FUST, *fûst* (or FAUST), JOHANN: d. abt. 1466: associate of Gutenberg (q.v.) and Schöffer in establishing the art of printing. There is much obscurity about his early life and employments. He has been called the inventor of printing, the scion of a rich and respectable burgher family of Mainz, and a wealthy goldsmith. The name was written FUST till 1506, when Johann Schöffer, Fust's grandson, in dedicating a translation of Livy to the emperor, wrote it FAUST, and his descendants observed the same spelling. The facts appear to be that, instead of being a goldsmith as was his brother Jacob, Fust was a kind of banker or broker, a lender of money at high interest; that his association with Gutenberg and the development of printing was owing to a purely business accident—that, becoming acquainted with him at the time he was struggling to perfect his scheme of typography, he lent him money to carry on his experiments; and that subsequently, discerning the great value of Gutenberg's discovery, he took advantage of his pecuniary helplessness to rob him of the fruits of his invention. It is known that Fust prosecuted Gutenberg to re-

cover money advanced to him, 1455; that, on the inventor's declaration of inability to pay, Fust took possession of the entire business; that Fust then associated Peter Schöffer, his son-in-law and a caligrapher of much note, with himself, and that they continued the business with large success till 1462. The sacking of Mainz in that year caused a dispersion of the workmen, and the secrets of the art were conveyed by them to other cities. Fust himself went to Paris, doubtless with the intention of establishing himself in business in that city, and in 1466, July, presented Louis de Lavernade, first pres. of the parliament of Toulouse, a copy of his second edition of Cicero. During the two succeeding months, Paris was ravaged by a terrible plague, and it is believed that Fust succumbed to it, Oct. 30. The association of Fust with Gutenberg began 1450, Aug. 22, when Fust agreed to advance the inventor 800 gold florins to make and procure tools and materials, and 300 florins a year for his wages and living and business expenses. Fust held a mortgage on the tools and materials for security, and both he and Gutenberg were to share profits equally. Under this arrangement, Gutenberg first printed at his house in Zum Jungen a *Catholicon*, probably a small glossary for children, long since lost, and followed it with *Donatus de octo partibus orationis*, containing 27 lines to the page (1451); the *Letters of Indulgence* granted by Pope Nicholas V. to the ambassador of the king of Cyprus, of which 13 copies printed on vellum remain (1454); and an *Appeal to Christendom against the Turks*. Their most noted work was the Latin Bible, known as the 42-line Bible from the number of lines on a page, and as the Mazarin Bible because the first described copy was found in the library of Cardinal Mazarin. This work was a folio of 1,282 printed pages, a close imitation of the best writing, with spaces left for the illumination of initials by hand, and was finished 1455. The Lenox Library, in New York, has the only complete copy of this work in the United States, for which the late James Lenox paid $2,600. After Fust secured sole control of the business and associated his son-in-law with him, he published first a *Psalter* (1457, Aug. 14), a work of 350 pages, the first printed book with complete date, which had large initials printed in two colors each, red and blue, from type made in two pieces. Schöffer is credited with having discovered a method of founding characters or type by means of a punch, and it has been claimed that he invented also the movable mold; but in the colophon of the *Psalter* he claimed only the mode of printing rubrics and colored capitals. The *Psalter* was followed by *Rationale divinorum officiorum* (Durandus), fol., 160 leaves (1459); the *Clementine Constitutions* with the gloss of Johannes Andreæ, 51 leaves (1460); several papal bulls, proclamations of Adolf of Nassau, etc. (1461-2); *Biblia Sacra Latina*, fol., 2 vols. 242 and 239 leaves, 48 lines to page (1462); the *Sixth Book of Decretals*, with Andreæ's

gloss, fol., 141 leaves (1465, Dec. 17); Cicero's *De Officiis*, 4to, 88 leaves (1465; first printed classic author; copy in the Astor Library, New York); and *Grammatica rhytmica*, fol., 11 leaves (1466). For many years Fust the printer was confounded with Faust the physician, who, according to the legend, made a bargain with the devil at the price of his own soul, and afterward was known as Dr. Faust the magician. The assertion of their identity once made, it is not to be wondered that the superstitious of the day should have given it wide circulation. In support of the theory, it was claimed that the art of printing was taught Fust by the devil; and when Fust stated in his colophons that his books were not made with pen or pencil—as all the books with which the people of Germany were then familiar had been—it is easy to be seen how quickly the people should have associated such an assertion with magic. Again, it was impossible to understand how several copies of an identical book could be exactly similar in every respect as the copies of Fust's *Bible* were, except on the ground of Satanic agency. It is narrated that Fust the printer sold copies of his *Bible* in Paris; and when their similarity was discovered, the purchasers became alarmed, returned their books, demanded their money back, and drove Fust to seek safety first in Mainz and then in Strasburg. Some authorities have further claimed that legal proceedings were taken in Paris against Fust the printer on the ground that he was a magician; but no records have been found to sustain the claim. Another subject of wonder and accusation was that Fust could produce as many copies of a book in a day as the skilled copyists in the convents could perfect in a year; and this ability was charged to his compact with the devil, for in their estimation no mortal man could work so rapidly. It was said too that Fust incurred the hatred of the monks, who grew rich by copying the books of the day, because they feared his black art would cut off their income. But against this it is known that Gutenberg, Schöffer, and Fust the printer were on friendly terms with the inmates of many convents and monasteries; and, further, that it was the custom of the early printers to set up their presses in large monasteries. The controversial literature on the two Fusts is voluminous, profound, and at this day curious. See FAUST, DR.

FUSTED, a. *fŭs'tĕd* [OF. *fusté*, tasting or smelling of the cask]: having a bad smell, moldy. FUS'TY, a. *-tĭ*, ill-smelling; rank. FUS'TINESS, n. an ill smell from moldiness, etc. FUST, v. in *OE.*, to grow fusty or smelling of mold. FUS'TING, imp. FUS'TED, pp.

FUSTET. See FUSTIC.

FUSTIAN, n. *fŭst'yan* [OF. *fustaine*— from It. *fustagno*, fustian—so called as brought from *Fostat*, near Cairo, or another name of Cairo]: a thick, strong cloth made of cotton, having a pile like velvet, but shorter, and manu-

factured in nearly the same manner—viz., by leaving loops standing upon the face of the fabric, and then cutting them through so as to form upright threads, afterward smoothed by shearing, singeing, and brushing: see VELVET: also MOLESKIN AND CORDUROY. An inflated swelling kind of writing or speaking; bombast: ADJ. made of fustian; absurdly pompous.

FUSTIC, n. *fŭs'tĭk*, or FUSTET, n. *fŭs'tĕt* [F. *fustoc* or *fustet*): name given to two kinds of dye-wood used for producing a yellow color, and with chemical additions, other colors, such as brown, olive, and green. The French name *Fustoc* seems connected with *Fustet*, a kind of sumac found in the s. of Europe; and to have been transferred to a very different plant, the *Maclura tinctoria* of Don, or *Morus tinctoria*, tree of nat. ord. *Moraceæ*, native of the W. Indies, Mexico, Brazil, Columbia, etc. The fustic is a large and handsome tree, the wood is of greenish-yellow color, used sometimes in mosaic cabinet-work and turning, but chiefly in dyeing. About 10,000 tons are brought annually into Britain. The tree is very abundant in Campeachy. The wood contains a great quantity of coloring matter, which forms the most durable of vegetable yellow dyes; but as the color is rather dull, it is used more for producing other colors. The name OLD FUSTIC is sometimes given to it, and YOUNG FUSTIC to the wood of *Rhus cotinus*. These terms began to be employed about the beginning of last century, from the mistaken notion that the one, in small pieces, was the wood of the young tree, and the other, in comparatively large logs, of the same tree in a more mature state. The OSAGE ORANGE (q.v.) of N. America (*Maclura aurantiaca*) is nearly allied to old fustic; its wood also affords a yellow dye. OLD FUSTIC, or Yellow Wood, is employed for dyeing woolens yellow, also to impart to them green and olive colors when mixed with indigo and salts of iron. It furnishes a yellow coloring matter, which may be obtained in crystals by evaporating its watery solution. This substance is termed moritannic acid, composition $C_{13}H_{10}O_6$. The bichromates of potash and of lead have largely superseded Old Fustic. YOUNG FUSTIC is the wood of *Rhus cotinus* or *Venetian sumac*. It contains a yellow coloring matter, to which the name *Fusteric* or *Fustin* has been given. It is used generally in combination with other dyes, in order to strike some particular tint.

FUSTIGATE, v. *fŭs'tĭ-gāt* [L. *fustigātŭs*, cudgelled—from *fustis*, a cudgel]: to beat with a cudgel or stick. FUS'TIGATING, imp. FUS'TIGATED, pp. FUS'TIGA'TION, n. *-gā'shŭn*, a beating with a stick or cudgel.

FUSTY. See under FUSTED.

FUSUS, n. *fū'zŭs*, [L. *fusus*, a spindle]: a genus of gasteropodous mollusks nearly allied to *Murex* (q.v.), having a spindle-shaped shell, with a very elevated spire, the first whorl often much dilated, and a straight elon-

gated canal. The whorls are not crossed by varices, as in *Murex*: the species were formerly, however, included in that genus. About 100 existing species have been described, and more than three times that number of fossil ones. The existing species are distributed over the whole world, living generally on muddy and sandy sea-bottoms at no great depths. *F. antiquus* is known in the s. of England as the RED WHELK, and in Scotland as the ROARING BUCKIE, from the continuous sound—as of waves breaking on the shore—heard when the empty shell is applied to the ear. In the cottages of Zetland, the shell, generally about six inches long, is used for a lamp, being suspended horizontally by a cord, its cavity containing the oil, and the wick passing through the canal. This mollusk is often dredged up with oysters. It is eaten by the poor, but is used as bait for cod, skates, etc. This genus makes its first appearance in the Oolite, in which 10 species have been noticed. The numbers increase to 35 in the Cretaceous rocks, to 100 in the Eocene, and to 150 in the Miocene and Pliocene. FUSULINA, n. *fū'zū-lī'nă*, in *geol.*, a genus of spindle-shaped foraminifera of the carboniferous formation.

FUTHORK, n.: the Runic alphabet. See RUNES.

FUTILE, a. *fū'tīl* or *-tĭl* [L. *futile*, light, vain—from L. *fūtĭlĭs*, that cannot contain, that cannot be relied on]: trifling; of no weight or importance; of no effect; unsuccessful. FU'TILELY, ad. *-lĭ*. FUTILITY, n. *fū'tĭl'ĭ-tĭ*, want of weight or effect; worthlessness. FUTILITARIAN, n. *-tär'ĭ-an*, one who pursues what is worthless.

FUTTOCKS, n. plu. *fŭt'tŏks* [corruption of *foot-stocks* or *foot-locks*]: the upright curved timbers or ribs of a ship springing from the keel, which hold the ship together; small shrouds over the lower ones.

FUTURE, a. *fū'tūr* or *-chûr* [F. *futur*—from L. *futūrŭs*, about to be: It. *futuro*]: that is to come; that which is to exist: N. time to come; a tense in grammar implying an event to come. FUTURITY, n. *fū-tū'rĭ-tĭ*, time to come. FU'TURIST, n. *-ĭst*, one who believes that the Bible prophecies are to be fulfilled in the future.

FU'TURE DEBT: debt in which the obligation to pay and the time for payment is fixed and certain, but the day for performance has not arrived. Of such a debt, it was said in the civil wär *dies cedit etsi nondum venerit;* and it was distinguished from a contingent debt, i.e., a debt payable on the performance of a condition which was uncertain, in which it was said *dies nec cedit nec venit*. Thus, an obligation to pay six months hence is a future debt; an obligation to pay 'if my ship returns from Spain,' is contingent. In the event of the death or bankruptcy of a person having large commercial transactions, it is often of great importance that the right of the holders of such securities should be accurately fixed. In Rome, on the death or bankruptcy of a citizen, a creditor holding a claim for a future debt was entitled to

payment, deducting a percentage proportionate to the date at which his debt was payable; but a contingent creditor received only a security for payment in case his debt should become payable. This general principle has been introduced into the legal systems of modern states. In England, a future debt in order to found a valid claim, must be in writing, but may be constituted by bond, bill, or note or other security. By common law, such a claim could not be enforced until the actual time for payment arrived; and formerly, in case of bankruptcy, a creditor on a debt of this kind was not allowed to insist in his claim. At the same time, the bankrupt's discharge was held not to release him from a debt which had not been admitted to claim in the process; and hence debtors were sometimes incarcerated for years on debts which they were wholly unable to discharge (see IMPRISONMENT FOR DEBT). This state of things was productive of manifest injustice on both debtor and creditor; on the latter, by excluding him from insisting in his claim at a time when he might have obtained a partial payment; on the former, by punishing him for his default when he was deprived of the means of making any return. The rule now is that, in bankruptcy, where a debt is not immediately payable, the creditor is entitled to prove his debt, and receive a dividend, deducting interest at 5 per cent. for the period to elapse before the date when the debt becomes payable. All debts are future in bankruptcy which were not payable when the debtor committed an act of bankruptcy. A debtor may petition for bankruptcy in respect of a future debt.

FUTURE ESTATE, in Law: estate which is to come into one's possession at a future day. According to 11 N. Y. Rev. Stat. 3d ed., a future estate is an estate limited to commence in possession at a future day either without the intervention of a precedent estate, or on the determination by lapse of time, or otherwise, of a precedent estate created at the same time. In general a future estate includes remainders reversions, contingents, and executory devises; that defined above is declared to be vested or contingent, but excludes reversions which cannot be said to be created at the same time, because they are a remnant of the original estate remaining in the greater. (Bouvier.)

FUTURE LIFE. See HEAVEN; HELL; IMMORTALITY.

FUX, *fûks*, JOHANN JOSEPH: 1660-1741; b. Marein, Styria, Austria: composer. He is supposed to have been born of poor parents. That he was educated for an organist is apparent from the fact that he held such a position in one of the principal churches of Vienna 1696, and the thoroughness of his education is attested by his appointment by Leopold I. as imperial court composer 1698. He became organist at St. Stephen's Cathedral, Vienna 1704, and passed the remainder of his life in the Austrian court under Leopold, Joseph I., and Charles VI. Fux

composed the opera *La Constanza e la Fartezza* for the coronation of Charles VI. as king of Bohemia 1723, and being sick at the time of its performance at Prague was carried on a litter from Vienna and seated in the imperial box at the theatre by the emperor-king's command. He composed upward of 400 musical works, and a noted theoretical work on music, *Gradus ad Parnassium sive manuductio ad compositionem musicæ regularem methoda nova ac certa nondum ante tam exacta ordine in luccm edita, elaborata a Joanne Joscpho Fux* (Vienna 1725), which Charles VI. had published at his own expense.

FUZE. See FUSE.

FUZEE, n. *fū-zē'* [F. *fusée*, a spindleful of thread]: a dangerous excrescence on the shank-bone of a horse, piercing the bone.

FUZZ, v. *fŭz* [Ger. *pfuschen;* Swiss, *pfusen*, imitative of the sound of water flying off a heated surface]: to fly off with a buzzing noise, as water from a hot surface. FUZ'ZING, imp. FUZZED, pp. *fūzd.* FUZZLE, v. *fŭz'l*, to confuse the head with drink; to fuddle. FUZZLING, imp. *fŭz'lĭng.* FUZZLED, pp. *fŭz'ld.* FUZZY, a. *fŭz'zĭ* [Scot. *fossy* or *fozy*]: consisting of a frothy spongy mass. FUZZBALL, a kind of fungus filled with dust; the puff-ball.

FY, int, *fī* [Ger. *pfui*]: a word expressing blame, dislike, or disapprobation; for shame.

FYKE, n. *fīk* [etym. doubtful]: a bag-net, open at one end, to allow fish to enter, but opposing their exit.

FYNE, *fīn*, LOCH: arm of the sea extending n. and n.e. from the Sound of Bute in the s. of Argyleshire, to beyond Inverary in the north; bounded by the district of Cowal on the e., and by those of Argyle, Knapdale, and part of Cantire on the w. It is 43 m. long, 2 to 10 m. broad, and 40 to 70 fathoms deep. Its shores are deeply indented and bordered by low bare hills, which rise higher and are wooded near Inverary. On the w. side, it sends off a small branch leading to the Crinan canal. Loch Fyne is noted for its herrings.

G.

G, or g, *jē:* seventh letter in the Roman alphabet, and in the modern alphabets derived from it; a consonant. For the history of the character, see ALPHABET: also C. The original and proper sound of G (corresponding to Gr. γ) is heard in *gun, give, glad.* But the same natural process which turned the *k*-sound of *e* before *e* and *i* into that of *s* (see C), produced a similar change on G, so that before *e* and *i* it came to be pronounced by the Latins like *dzh.* The sibilation of the letter *g* before *i* followed by a vowel, had begun as early as 4th c. after Christ, as is evident from the misspelling in inscriptions; in the case of *c,* the change can be detected much earlier. From the Latin, the *dzh*-sound of *g* passed into the Romanic tongues, and into English. As a rule in English, in words derived from the classical and Romanic languages, *g* has the hissing sound before *e, i,* and *y;* it has its natural sound in all words before *a, o,* and *u;* and it retains it in Teutonic words even before *e* and *i.*

G, in its proper power, belongs to the order of gutturals, *k* or *c, g, eh, gh;* of the two 'bare' gutturals, *g* is the *flat* (or medial), and *k* the *sharp;* while *gh* and *eh* are the corresponding aspirates (q.v.).

The following are some of the interchanges between *g* and other letters: Lat. *ager,* Gr. *agros,* Eng. *acre,* Ger. *acker;* Gr. *triakonta,* Lat. *triginta;* Gr. *gonu,* Lat. *genu,* Eng. *knee;* Lat. (g) *nosco,* Gr. *gignosco,* Eng. *know;* Lat. *genus,* Eng. *kin;* Gr. *chen,* Ger. *gans,* Eng. *goose* and *gander;* Lat. *hesternus,* Ger. *gestern,* Eng. *yester* (day); Lat. *germanus,* Span. *hermano.* The convertibility of *g* and *y* is seen in the old English participle in *y,* as *yclad,* corresponding to Sax. and Ger. *ge-;* in Ger. *gelb,* Eng. *yellow;* Ger. *tag,* Eng. *day;* Ger. *mag,* Eng. *may; yate* for *gate; yard* for *garden,* Lat. *hortus.* In Italian, *gi* is substituted for *j,* as *Giulio* for *Julius;* and in French, which has no *w,* that letter is represented by *gu,* as *guerre, guarder,* for Eng. *war, ward,* or *guard.* G has been frequently dropped out, as Lat. *noseo* for *gnosco;* Eng. *enough,* compared with Ger. *Genug; agone,* with *ge gangen;* Lat. *magister,* Fr. *maistre* or *maître,* Eng. *master. May,* Lat. *Maius,* contracted from *Magius,* is from a root *mag,* or (Skr.) *mah,* to grow: so that May means the season of growth.

G, in Music, is the fifth sound of the natural diatonic scale of C, and the eighth sound of the chromatic scale. It stands in proportion to C as 2 to 3; is a perfect fifth above C, and the second harmonic arising from C as a fundamental note. In the solmization of Guido Are-

tinus, the note G was called Sol, Re, or Ut, according as the hexachord began with C, F, or G. G major as a key has one sharp at its signature, viz., F sharp. G minor has two flats at its signature, viz., B flat and E flat.

GAAL, *gâl,* JOSEF: Hungarian author: b. Nagy Karoly, 1811; d. 1866. He studied at Buda college and at the Univ. of Pesth, and entered the administrative career, being attached to the Hungarian council of lieutenancy. Gaal began writing early, and proved equally successful when gossiping in the columns of Kossuth's famous *Pesti Hirlap,* and when engaged in translating a masterpiece of Cervantes, filling the periodicals with tales and novels, or furnishing original works for the National Theatre. The sketches of country-life as it was, and as it still continues on the vast plains of Hungary, are nowhere more vivid and more true than in Gaal's comedies and tales. The following are some of his original compositions: *Szirmay Ilona,* novel, 2 vols. (Pesth 1836); *Peleskei Notarius* (The Notary of Peleske, Pesth 1838), comedy in four acts—might be called *the* Hungarian comedy *par excellence; Szvatopluk,* tragedy in five acts. Tales: *Pusztai Kaland* (An Adventure on the Hungarian Prairies); *Tengeri Kaland az Alfoeldoen* (Seafaring Adventures in Lower Hungary); *Hortobâgyi éjszaka* (A Night on the Heath of Hortobbágy). During the sojourn of the Hungarian Diet at Debreczin (1849) Gaal was editor of a journal combating extreme radical views.

GABARDINE, or GABERDINE, n. *găb ér-dēn* [Sp. *gabardina*]: a loose outer garment; in the *middle ages* a long loose coat or cassock rendered obligatory on the Jews to wear.

GABBLE, v. *găb'l* [Icel. *gabba,* to mock; *gabb,* silly talk]: Scot. *gab,* the mouth, talk: Dan. *gab;* Gael. *gab,* mouth]: to prate; to talk idly and rapidly, or without meaning: N. loud or rapid talking without meaning; inarticulate sounds. GAB'BLING, imp. GABBLED, pp. *găb'ld.* GABBLER, n. *găb'lẽr,* one who. GAB, n. *găb, familiarly,* talkativeness; loquacity: V. to talk much; to talk idly. GAB'BING, imp. GABBED, pp. *găbd.*

GABBRO, *găb'brō*: Italian name of a variety of greenstone composed of felspar and diallage. It is equivalent to euphotide or diallage rock.

GABELENTZ, *gâ'bėh-lĕnts,* HANS CONON VON DER: 1807, Oct. 13—1874: b. Altenburg: German philologist. He was educated at the universities of Leipsic and Göttingen. He then studied the Finno-Tartaric languages, and published, 1883, his *Eléments de la Grammaire Mandschoue* in which the entire idiomatic character of that language was developed in concise rules. He was interested also in oriental learning. With J. Löbe, he published a critical edition of the Gothic translation of the Bible by Ulfilas, with a Latin translation, and with

a Gothic glossary and grammar appended (Leipsic 1843-46). Besides a Syrjan grammar (*Grundzüge der Syrjänisehen Grammatik*, Altenburg 1841), he furnished contributions to periodicals on the Mordvinian and Samoyed languages. An important contribution to the science of language, is his *Die Melanesisehen Sprachen* (2 vols. 1860, 73). The *Beiträge zur Spraehenkunde*, in three parts, appeared 1852, and *Ueber das Passivum* 1860. In 1864 he published the Mantchurian translation of the Chinese works, *Se-sehu, Sehu-king, and Sehi-king*, with a glossary in German. Gabelentz knew more than 80 languages.

GABELLE, *ga-bĕl'* [F., from Ger. *gabe*, gift or tribute]: originally in general, every kind of indirect tax, especially the tax upon salt. This impost, established 1286, in the reign of Philippe IV., was meant to be only temporary, but was declared perpetual by Charles V. It varied in the different provinces. Those that were most heavily taxed were called *pays de grande gabelle*, and those that were least heavily taxed, *pays de petite gabelle*. It was unpopular from the first, and the attempt to collect it occasioned frequent disturbances. It was finally suppressed 1789. The name *gabelous* is still given by the common people in France to tax-gatherers.

GABERDINE, n. See GABARDINE.

GABERLILTIE, n. *gā'bēr-lĭl'tĭ* [Gael. *gabair*, a talker; Scot. *lilt*, Gael. *luailte*, a merry lay or song]: in *prov. Eng.*, a ballad-singer. GABERLUNZIE, n. *gā'bér-lôn'zĭ* [Gael. *lundair*, an idle talkative beggar; or *gaban*, cloak, and *lunzie*, linsey-woolsey—from the clothing]: in *Scot.*, the man who carries the wallet; a privileged beggar—also called a *bedesman* or *bluegown*. See BEAD.

GABION, n. *gā'bĭ-ŭn* [F. *gabion*—from It. *gabbia*, a cage; *gabbione*, a gabion—related to L. *eavea*, hollow]: hollow cylinder of basket-work, employed in field or temporary fortification, and varying in diameter from 20 inches to 6 ft. in height from 2 ft. 9 inches to 6 ft. In constructing it, stout straight stakes are placed upright in the ground in a circle of the required diameter, and are then wattled together with osiers or green twigs, as in the formation of baskets. The apparatus being raised from the ground, the ends are fastened and the gabion is ready to be rolled to any place where it is desirable to form a breast-work against the enemy. Placed on end, and filled with earth, a single row is proof, except at the points of junction, against musketry fire, and by increasing the number of rows, any degree of security can be obtained. The gabion has the advantage of being easily movable; while with its aid a parapet can be formed with far less earth, and therefore in less time, than in cases when allowance has to be made for the slopes on both sides, necessary in ordinary earthern walls. The *sap-roller* consists of two concentric gabions, one 4 ft., the other 2 ft. 8 inches in dia-

meter, with the space between them wedged full of pickets of hard wood. In sapping (see MINES), these serve as substitutes for mantlets.—*Stuffed Gabions* are gabions rammed full of broken branches and small wood; being light in weight, they are rolled before soldiers in the trenches, and afford some, though not very efficient, protection against musketry fire.—*Gabionade* or *Gabbionnade,-nād,* is a line of gabions thrown up by troops as a defense, after being driven back from other more solid positions. In carrying a well-defended fortress, gabionade after gabionade has sometimes to be stormed before the besieged can be compelled to surrender.

GABLE, n. *gā'bl* [OF. *gable*—from mid. L. *gabŭlum,* a gable: Goth. *gibla,* a pinnacle: Ger. *giebel,* the pointed end of a house: Dan. *gavl,* a gable]: the triangular part of an exterior wall of a building, between the top of the sidewalls and the two slopes of the roof. The whole wall of which the gable forms the top is called a gable-end; party-walls, or the walls which separate two contiguous houses and which belong equally to both houses, are called in Scotland 'mutual gables.'

The gable is one of the most common and characteristic features of Gothic architecture. The end walls of classic buildings had *Pediments* (q. v.), which followed the slope of the roofs, but these were always low in pitch. In mediæval architecture, gables of every angle are used with the utmost freedom, and when covered with the molded and crocketed copes of the richer periods of the style, give great variety and beauty of outline.

Gablet, -blĕt, a small gable. Gablets are used in great profusion in the more decorative parts of Gothic architecture, such as canopies, pinnacles, summits of niches or tabernacles, where they are introduced in endless variety with tracery, crockets, and other enrichments.

The towns of the middle ages had almost all the gables of the houses toward the streets, producing great diversity and picturesqueness of effect, as may still be seen in many towns which have been little modernized. The towns of Belgium and Germany especially retain this mediæval arrangement. In the later Gothic and the Renaissance periods, the simple outline of the gable became stepped and broken in the most fantastic manner.

GABLOCK, n. *găb'lŏk* [from *gavelock,* a spear, a javelin]: a false spur of iron or steel fitted to the heel of a game-cock to make it more effective in fighting.

GABOON, *gâ-bôn':* estuary opening into the Atlantic on the w. coast of Africa immediately n. of the equator; sometimes called Gaboon river; and by different tribes on its shores, called Old Mpongwé and Aboka. About 18 m. wide at its mouth, it is about 7 m. wide at 40 m. inland; and then the Gaboon proper may be said to end, and the Rio Olambo, 2 or 3 m. wide, begins. Into this Rio Olambo two considerable rivers discharge, known as Komo and Mbokwa, the former having the longer course.

The navigation of the estuary is much encumbered by numerous reefs, shoals, and islets. The principal races in the Gaboon country are the Mpongwé, a branch of the Great Bantu stock, to which the Zulus belong, and the cannibal Fans (q. v.). The Mpongwé are among the most civilized of African native tribes, and are keen traders; they are ludicrously vain and fond of finery. The warlike Fans are invaders from the e., and have rapidly increased in numbers in the country between the Gaboon and Ogobai. First visited by the Portuguese, the Gaboon early became a great seat of the slave trade. 1840-45, a district on the Gaboon became a French settlement, Libreville being the chief town. Before the Franco-German War 1870, the area of the French colony was given at 8,000 sq. m., pop. 186,000. The French never attached any importance to the colony till after Savorguan de Brazza explored it in 1876-86. The area of the colony was estimated (1903) at 173,700 sq. m., and for administrative purposes the region was attached to the colony of Senegambia. There are numerous mission stations, Rom. Cath. and Protest.

GABRIEL, *gā'brĭ-ĕl* (Heb. the man or mighty one of God): in the Jewish angelology, one of the seven archangels. He appears in the book of Daniel as the interpreter of the prophet's vision (chap. viii.), and announces the future appearance of the Messiah (ix. 21-27). In the New Testament, he reveals to Zacharias the birth of John the Baptist (Luke, i. 11), and to the Virgin Mary the birth of Christ (Luke, i. 26). According to the Rabbins, he is the angel of death for the people of Israel, whose souls are intrusted to his care. The Talmud describes him as the prince of fire, and as the spirit who presides over the thunder and the ripening of fruits. When Nebuchadnezzar besieged Jerusalem, Gabriel is believed to have entered the temple, by command of Jehovah, before the Assyrian soldiery, and burned it, thereby frustrating their impious intentions. Gabriel has also the reputation among the Rabbins of being a most distinguished linguist, having taught Joseph the 70 languages spoken at Babel, and, being in addition, the only angel who could speak Chaldee and Syriae. The Mohammedans hold Gabriel in even greater reverence than the Jews, and regard him as the chief of the four most favored angels who form the council of God; he is called the spirit of truth, and is believed to have dictated the Koran to Mohammed. It should be observed that Gabriel is nowhere in the Bible spoken of as an archangel: see ARCHANGEL.

GABRIEL-BELL. See SACRING-BELL.

GA'BRIEL CHANNEL: in the islands of Tierra del Fuego, between Dawson Island and Madalen Channel; lat. 54° 20′ s., long. 70° 40′ n. It is 25 m. long, 2 to 3 m. wide at the extremities, and narrower between those points. The coast on each side rises abruptly to a height

of 1,500 ft., a glacier towers between the Sarmiento and Buckland Mountains, and the locality is swept by violent 'williwaws' or whirlwinds.

GABRIELITES, n. *gā'brĭ-ĕl-īts* [named from *Gabriel* Scheeling, their founder]: sect of Anabaptists who existed for some time in Pomerania.

GABRIELLI, *gâ-brē-ĕl'lē*, Catarina: 1730-96; b. Rome: vocalist. She was daughter of Count Gabrielli's cook, and possessing a remarkable voice was educated by Garcia and Porpora at the count's expense. She made her first appearance as an opera singer at Lucca 1747, and later became so popular as Dido in Jomelli's opera of that name, that she was engaged as prima for the Vienna opera 1750. She became the mistress of the infante Don Ferdinand in Parma, and was forced by his jealousy to flee to St. Petersburg where she was cordially received by Empress Catharine II. and demanded 5,000 roubles per month for singing. Subsequently she returned to Italy, and in her last performances sang with her rival Marchesi in Milan, the event leading to serious disturbances between the friends of the singers.

GABRIELS, Henry, American Roman Catholic prelate: b. Wannegem-Lede, Belgium, 1838, Oct. 6. He studied classics in the colleges of Audenarde and Saint Nicholas and theology in the Seminary of Ghent, where he was ordained priest 1861, Sept. 21. He continued his studies at the University of Louvain, from which institution he received the degree of S. T. L. in 1864 and the honorary degree of Doctor of Theology in 1882. When the Theological Seminary of Troy, N. Y., was founded, Dr. Gabriels was one of the four priests sent from Belgium to manage it. He was diocesan examiner for New York and Albany, vicar-general of Ogdensburg and Burlington and one of the secretaries of the Third Plenary Council of Baltimore, the decrees of which he assisted in formulating. For 20 years Dr. Gabriels was rector of Troy Seminary and for nearly 30 years its professor of dogmatic theology, Church history and Hebrew. In 1891, Dec. 21, Pope Leo XIII. appointed him bishop of Ogdensburg and he was consecrated at Albany, N. Y., 1892, May 5. King Leopold of Belgium has recently conferred upon him the decoration of the Royal Order of Leopolds in recognition of the services he has rendered the Belgium Church and people, particularly by his writings.

GACHARD, *gâ-shâr'*, Louis Prosper: principal archivist of Belgium: b. in France about 1800. Originally a compositor, he removed to Belgium, took part in the revolution of 1830, and was naturalized 1831, and appointed keeper of the public records. His principal writings are, *Analectes Belgiques* (1830); *Documents Politiques et Diplomatiques sur la Révolution Belge de* 1790 (1834); *Mémoires sur les Bollandistes et leurs Travaux depuis* 1773 *jusqu'en* 1789 (1847); *Correspondance de*

Guillaume le Taciturne (1847-51); *Correspondance de Philippe II., sur les Affaires des Pays-Bas* (1848-51); *Correspondance du Duc d' Albe sur l'Invasion du Comte Louis de Nassau en Frise* (1850); *Retraite et Mort de Charles-Quint* (1854), and *Relation des Troubles de Grand sous Charles-Quint* (1856). Gachard issued 1863, *Don Carlos et Philippe II.;* 1866, *Actes des Etats Généraux des Pays-Bas;* 1867, *Correspondance de Marquerite d'Autriche avec Philippe II.;* 1869, *Jeanne la Folle;* and *La Bibliothèque des Princes Corsini à Ro.*

GAD, n. *găd* [Icel. *gaddr*, a goad, a spike: Norw. *gadd*, a sharp point: prov. Dan. *gadd*, a prickle: comp. Gael. *gath*, a sting]: in *mining*, a pointed wedge of a peculiar form, used to break up the ore under ground; a graver; in *OE.*, an arrow or spear head, a pointed knob, and the like: V. to ramble about without any fixed purpose, as cattle flying from the attack of the gad-fly. GAD'DING, imp. ADJ. roving. GAD'DINGLY, ad. *lĭ*, in a gadding manner. GAD'DED, pp. GAD-FLY, fly that goads or stings cattle, and deposits its eggs in their skin (see BOT—BOT-FLY: TABANUS). GADABOUT, n., or GADDER, n. *găd'ẽr*, one who runs much abroad without business; a rambling tittle-tattler. GADSTEEL, n. Flemish steel, so called from its manufacture into gads. UPON THE GAD, in *OE.*, upon a sudden; with undue or impetuous haste.

GAD, *găd:* first-born of Zilpah, Leah's maid, and seventh son of Jacob. His name is differently explained.—The *tribe* of Gad numbered in the wilderness of Sinai more than 40,000 fighting-men. Nomadic by nature, and possessing large herds of cattle, they preferred to remain on the e. side of Jordan, and were reluctantly allowed to do so by Joshua, on condition of assisting their countrymen in the conquest and subjugation of Canaan. Their territory lay n. of that of Reuben, and comprised the mountainous district known as Gilead, through which flowed the brook Jabbok: it touched the Sea of Galilee at its n. extremity, and extended e. to Rabbath-Ammon. The men of Gad—if we may judge from the 11 warriors who joined David in his extremity—were a race of stalwart heroes. Jephthah the Gileadite, Barzillai, Elijah the Tishbite, and Gad '*the* seer,' were in all probability members of this tribe.

GADARA, *găd'a-râ:* one of the 10 cities of the Decapolis (q.v.), and ancient cap. of Peræa, often mistaken for Gerasa; 8 m. s.e. of Lake Tiberias; on a hill s. of the Hieromax. Polybius chronicles its capture by Antiochus the Great, B.C. 218, and declares it the strongest of all the cities in that part of the country. It was fortified with unusual skill, contained a court of justice, and had numerous hot baths and medicinal springs in its vicinity. Vespasian captured and reduced it to ashes, and its ruins, called in Arabic *Um Keis*, cover a space nearly 2 m. in circumference. These ruins indicate that Gadara was once a place of great splendor. The ancient pave-

ment of the chief thoroughfare has been pronounced a marvel of construction and beauty. Remains of tombs excavated in limestone rock show chambers 20 ft. sq., with numerous recesses in the sides, which are now occupied by the inhabitants as domiciles. Gadara was once the seat of a bishop, but lost its prestige after the Mohammedan conquest.

GADDEE, or GADDI, or GUDDEE, n. *gŭd'dē* [Hind.]: a rajah's throne; a cushion; a seat.

GADDI, *gâd'ē*, AGNOLO: painter: abt. 1324-1390; b. Florence, Italy; son of Taddeo Gaddi. He was educated by his father, and became equally eminent as painter and mosaist, but passed the latter part of his life in mercantile business in Venice. His best preserved works are in the chapel of the Holy Girdle in the cathedral of Prato, and in the choir of Santa Croce at Florence, the latter illustrating the serial history of the Holy Cross, with many allegorical allusions. He was a bold colorist, but poor in drawing, and nearly all his works make their best impression at some distance. As a composer he was considered superior to his father, and more dignified.

GAD'DI, GADDO: 1239-1312; b. Florence: painter and mosaist. He is believed to have executed the great mosaic within the portal of the cathedral of Florence, representing the coronation of the Virgin, and the mosaics within the portico of the church of S. Maria Maggiore at Rome, illustrating the legend of the founding of that church. It is known that he executed the mosaics of the choir and the front of the first cathedral of St. Peter, in Rome, the latter representing God the Father on a colossal scale and with many figures; also an altar-piece in the church of St. Maria Novella, in Florence. The two first sets above no longer exist, and there is a doubt whether any of his paintings, beyond mosaics, are extant. He was very successful, both artistically and financially, and laid the foundation of the future great wealth of the family.

GAD'DI, TADDEO: painter: 1300-66; b. Florence; son of Gaddo Gaddi. He was held at the baptismal font by Giotto, became the asst. and favorite of that master, and adopted his general style of painting. At times he was a painter, mosaist, architect, and merchant. Giotto removed to Naples 1330, and Gaddi is supposed to have begun painting on his own account about that time. His works include the frescoes in the Baroncelli chapel of the church of S. Croce, Florence, representing the Virgin and Child between Four Prophets, incidents in the legend of the Virgin from the expulsion of Joachim from the Temple to the Nativity, and the eight virtues. An altar-piece, the Virgin and Child, dated 1334, is in the Berlin Museum; a triptych (1336) of the Virgin and Four Saints, the Baptism of Jesus, and his Descent from the Cross, is in the Naples Gallery; and an altar-piece of the Virgin and Child surrounded by Angels (1355) is in the sacristy

of S. Pietro a Megognano. His best mosaic work extant is in the baptistery of Florence, and his architectural genius was shown in plans for the original Ponte S. Trinita, the present Ponte Vecchio, and the church of Orsan-Michele.

GADE, *gâ'dĕh*, NIELS WILHELM: 1817, Feb. 22—1890, Dec. 21; b. Copenhagen; composer. He became an accomplished performer on the violin and piano, then turned his attention to composition, and with his overture *Echoes of Ossian* won the prize of the Copenhagen Musical Union and a royal grant by which he was enabled to travel and study abroad 1841. While in Italy he composed a noted symphony in C minor, and 1844 was called to Leipsic to direct the Gewandhaus concerts in place of Mendelssohn. In 1848 he was appointed organist, director of music, and master of the chapel royal at Copenhagen; 1874 was elected a foreign member of the Berlin Acad. of Arts, 1876 was voted by the Danish Folkething a life pension of 3,000 crowns, and 1878 was elected a corresponding member of the French Institute. Besides prize compositions he has written five symphonies, a quintette, an octette, numerous romances, overtures, and sonatas, a lyrical drama, *Comala*, a religious cantata, *The Crusaders*, an opera, *Nibelungen*, *Erl King's Daughter*, and *Springtide Phantasy*.

GADIDÆ, *găd'ĭ-dē:* important family of malacopterous fishes, having a moderately elongated body covered with small soft scales, the head naked, all the fins soft and destitute of spines, the ventral fins placed under the throat and pointed, one dorsal fin or more, the air-bladder large. Some of the species are small, others attain a large size. To this family belong the Cod, Ling, Hake, Dorse, Haddock, Whiting, Coal-fish, Burbot, etc. The species are widely distributed. Most of them are marine: a few, as the Burbot, are fresh-water fishes: for the more important, see the several titles.

GADINIC, a. *găd-ĭn'ĭk* [L. *gadus*, a codfish]: derived from or in any way pertaining to the *Gadidæ*. GADINIC ACID, crystalline, fatty acid, obtained by cooling the turbid residue of cod-liver oil to 5°. It melts at 63°.

GADITANIAN, a. *găd-ĭ-tā'nĭ-an* [L. *Gaditanus*—from *Gades*, Cadiz]: of or pertaining to Cadiz, Spain: N. native or inhabitant of Cadiz.

GADJATCH, *gâd-yâtch'*, or GADITCH, *gâ-dĭtch':* town of S. Russia, province of Poltava, 65 m. n. by w. from the town of Poltava. It has seven churches and a monastery, and an active trade in agricultural produce. Pop. 8,110.

GADOLINITE, n. *găd-ōl'ĭn-īt* [after the Russian chemist *Gadolin*]: a silicate of yttria found in Sweden in imperfect green crystals, and in amorphous masses in granite.

GADSDEN, *găd'den*, CHRISTOPHER: 1724-1805, Aug.

28; b. Charleston, S. C.: statesman. He was educated in England, and on his return engaged in mercantile business in Philadelphia with success. He was a delegate to the first colonial congress 1765, and the first continental congress 1774, entered the army as senior col. of South Carolina militia at the beginning of the revolutionary war, became brig.gen. 1775, took part in the defense of Charleston 1776, and was one of the framers of the state constitution 1778. In 1779 he resigned his commission in the army, 1780 as lieut. gov. of South Carolina signed the capitulation of Charleston, and in violation of its terms was soon afterward arrested with 77 other leading citizens, and refusing parole, was confined in Fort Augustine 45 weeks. On being exchanged 1782 he was elected gov., but declined on account of age.

GADS'DEN, Christopher Edwards, d.d.: 1785, Nov. 25—1852, June 24; b. Charleston, grandson of Christopher Gadsden: bp. of the Prot. Episc. Church. He studied in the Associate Acad., Charleston, graduated at Yale College 1804, was ordained deacon 1807, July 25; priest 1810, Apr. 14; and was elected asst. rector of St. Philip's Church, Charleston, 1810, Feb.; succeeding to the rectorship 1814. In 1840, June 21, he was consecrated Bishop of South Carolina. He edited the *Gospel Messenger* several years, and beside sermons, charges, and essays, published *The Prayer-Book as It Is*. He received the degree of d.d. from South Carolina College 1815.

GADSDEN, James, American diplomatist: b. Charleston, S. C., 1788, May 15; d. there 1858, Dec. 25. He was graduated at Yale College in 1806; served with distinction in the War of 1812; and afterward took part in the campaign against the Seminole Indians. He was appointed minister to Mexico in 1853, and on December 30 of that year negotiated the Gadsden Purchase (q.v.), which fixed a new boundary between Mexico and the United States.

GADSDEN PURCHASE. See Boundaries of the United States, Disputes and Settlements.

GADS'HILL, England, a hill near Rochester, on the road from London to Gravesend. It is commemorated in Shakespeare's play, *Henry IV.*, as the place where Falstaff had his encounter with the robbers, and an inn at the place is called Falstaff's Inn. It is interesting in modern times for Gadshill Place, opposite the hill, which was long the residence of Charles Dickens and was the home in which he died.

GADSKI, Johanna, *yō-hân'nâ gâdz'kē*, German opera singer: b. Anclam, Prussia, 1871. She received her musical training in Stettin, made her début in opera in New York, and appeared as Brünhilde and in numerous other Wagnerian parts. She made a concert-tour in America in 1898-9.

GADWALL, *găd'wawl* (*Anas strepera*, or *Chauliodus*

strepera) : species of duck, not quite so large as the mallard, abundant in many parts of the continent of Europe, and in Asia, and in N. America. It is found also in n. Africa. Being a bird of passage, it is a native both of arctic and of tropical regions. The Gadwall breeds in marshes, and lays from seven to nine eggs. Except at the breeding season, it is usually seen in small flocks, and an individual is sometimes found in a flock of other ducks. Its voice is loud and harsh. It is much esteemed for the table.

GAELIC LITERATURE. Although the oldest existing MSS. in Gaelic are of no earlier date than the 7th century, there is ample evidence that the literature of the Gaels, not only the traditional but the written literature, is of much greater antiquity. The internal evidence furnished by the ancient sagas, songs and chronicles preserved in mediæval manuscripts indicates a regular development extending from a period antedating by many centuries the beginning of the Christian era, down to a time well within the compass of authentic history. And both the internal and external evidence point to the existence of a written as well as a traditional literature long before the Gael came into close contact with the civilization of the other nations of Western Europe.

The Gaelic, or Gaedhealg, language is an Indo-European tongue, highly inflected, and rich in beautiful forms, and euphonious combinations. It is spoken in Ireland, the Highlands of Scotland and the Isle of Man. Being a Celtic tongue it is akin to the Brythonic group of languages, the Welsh, Cornish and Breton, and to the tongues, now extinct, spoken by the Celtic peoples who occupied central Europe before the extension of the Roman power. The development of the language is usually assigned by scholars to three periods: Old Gaelic, from the earliest time to about the end of the 10th century, A.D.; Middle Gaelic, from the 11th to the 17th century; and Modern Gaelic, from the 17th century to the present day.

The present alphabet, which is a modification of the Roman, was introduced, it is believed, by Saint Patrick when he came in the 5th century to preach Christianity. But the art of writing was known before that. Many inscriptions have been found, especially in the southern counties, in Ogam, a system of writing which was peculiar to the early Irish. This script consisted of a series of short lines, drawn either above, below or through a stem-line. Each group of short lines represented a letter, the letter being indicated by the number and position, some being at right angles and some being at acute angles with the stem-line. This stem-line was generally the angle between two sides of a long upright rectangular stone. The vowels were indicated by very small cuts on the angle of the stone, but much larger than points. The use of Ogam was not confined to monumental inscriptions, for some small metal articles have been found

inscribed with it, and the old sagas and chronicles contain many illusions to Ogam writings on poets' staves, the shields of warriors and other articles. With the introduction of the modified Roman alphabet the use of Ogam was practically discontinued, although instances of its occasional use have been discovered. In a Saint Gall manuscript of the 9th century eight Ogam sentences were discovered, and others as late have been commented on by Zeuss, Nigra and others. How Ogam was invented is still a profound mystery, but it is certain that it is peculiar to the Irish Gael and only found where he settled.

The literary form in which the primitive Gaelic genius chiefly found expression was the *sgeul*, or *ursgeul*—the saga or song-story—partly in prose, partly in verse, which recited the deeds of gods and demi-gods and heroes in spirited and dramatic fashion. Of drama, strange to say, no trace can be found in ancient Ireland; there is not a record of even a mystery or a miracle play in the early Christian days. But the romance began early and reached a very advanced stage of development, probably long before the art of writing was known. It took the form of prose narrative, interspersed with flights of spirited and highly imaginative poetry. The *Book of Leinster*, a MS. of the 12th century, enumerates 187 of these romances and the names of many more are given in the 10th and 12th century tales of Mac Coise. Many of these tales show evidence of accretions during subsequent periods.

The value to the antiquarian and student of history of the material thus obtained is incalculable. For these old hero-tales give a vivid picture of the social life of the primitive Celts, a history of the early stages of Celtic civilization, that it is impossible to find elsewhere. The most important of these sagas resolve themselves into three distinct groups, representing three periods of the history of the race: The Mythological Cycle; the Heroic, or Red Branch Cycle, and the Fenian or Ossianic Cycle.

The Mythological Cycle.—In the oldest Gaelic sagas the confusion of gods and men is baffling. So thoroughly have the ancient deities been euhemerized that later generations came to look upon them simply as earlier races of inhabitants. These romances tell the story of successive settlements of Ireland. They tell of Partholan and his followers who were the earliest settlers; of Nemedh, who followed and possessed himself of the land; of the Fomorians, who conquered the Nemedians and drove them out; of the return some centuries later of the descendants of a part of the Nemedian force, now known as Firbolgs, to dispute with their former conquerors, and the subsequent return of the descendants of another division of the Nemedians, the Tuatha de Danaans, who in turn became masters of the land, holding it until the coming of the conquering Scots, or Gaels, or Milesians as they are variously called. The saga of the *'Battle of North*

Moytura' tells of the fight between the Tuatha de Danaans and the Firbolgs, which resulted in the utter defeat of the latter, who were driven into the smaller islands. This story and the story of the *Battle of South Moytura*, between the Tuatha de Danaans and the Fomorians, abound in descriptions of the marvellous achievements of the heroes and ends in the complete defeat of Fomorians. To this period belongs also the pathetic tale of the *Death of the Children of Tuireann*, included by Hyde in *The Three Sorrows of Story-Telling.*

The Red Branch, or Heroic Cycle.—This group of tales deals with the history of the Milesians, the warlike race which finally conquered the island and held it until the coming of the English. Unlike the earlier tales, which palpably treat of a fabulous age and purely mythical persons and events, these romances deal with a world which has an apparent basis of reality, despite the legendary character of many of the events there recorded, and of the heroes who participate in them. The people of this cycle, Cuchulain, Conall Cearnach, Deirdre, Naoise, Meve, Conor mac Nessa, Fergus mac Roigh, though of heroic stature, are yet human; their deeds, and the motives for those deeds, are human; and though the marvellous and the preternatural are found there in as marked a proportion as in the *Iliad* and the *Odyssey*, they do not dominate as in the tales of the Mythological Cycle. This group of romances is, without question, the finest in all the ancient Irish literature. The period, which is identified by the annalists with the birth of Christ and the beginning of the Christian Era, is associated chiefly with the long war between Connaught and Ulster arising out of the murder of the children of Usnach. This incident is recorded in one of the most beautiful and pathetic tales in the whole range of ancient story-telling, the tale of *Deirdre, or the Fate of the Children of Usnach.* Cuchulain, the Ultonian champion, is the great hero of this cycle. Conall Cearnach, Ferdiad and Meve, the warrior-queen, are figures hardly less heroic. The most important of the romances of this group is the *Tain Bo Cuailgne*, or the *Cattle Spoil of Cooley*, a tale that has proved a valuable source of information for the antiquarian from the light it throws on early Celtic life and manners. The *Death of Conlaoch* is a curious parallel of the story of Sohrab and Rustum.

Fenian or Ossianic Period.—Though Cuchulain is the great hero of the heroic age of the Gael, there is another of a later age who comes closer than he to the popular heart. Fionn, or Finn, mac Cumhail, if one may judge by the affectionate reverence with which his name and the records of his deeds are preserved in peasant lore, is without question the most popular of the traditional heroes. While the wonderful achievements of the elder hero are familiar to the scholar, those of Fionn are known to every unlettered peasant and are embalmed in folk songs and folk tales without number. Moreover,

the whole body of Fenian story is intimately bound up in the popular interest. Hyde points out that for a period of from 1,200 to 1,500 years these tales showed a most remarkable instanee of continuous literary evolution. Century after eentury saw aceretions in the form of stories and poems about Finn and the Fenians, and there are to-day extant in Gaelie-speaking eommunities numberless stories that have never been reduced to writing in which Finn is the central figure. This was never, at any time, true of Cuchulain and the Red Braneh Cyele. Finn is distinetively the popular hero, the hero who stands in the popular imagination for all that is heroie and patriotic.

The most faseinating, and when everything is considered, perhaps the most meritorious of the Fenian sagas is the *Pursuit of Diarmidh and Grainne.* Like the story of *Deirdre,* despite its antiquity the human appeal is almost modern, so elose does it come to our own manner of thought. It tells of Finn's suit for the hand of Grainne, daughter of Cormae mae Art, the High-King; Grainne's passion, developed while the negotiations for her hand were in progress, for Diarmidh of the Love-Spot, one of Finn's warriors; the flight of the pair and the pursuit of the vengeful Finn.

Miscellaneous Romanees.—Besides the stories of the three main groups above enumerated, there is a considerable number of sagas, some as old as those of the Red Branch Cycle, and some more reeent, whieh eannot well be included under any of these headings. The most important is the *Bruidhean of Da Derga,* a Leinster tale of the Red Branch period; and others that fall under this same heading are: *The Dream of Mac Conglinne,* a satire full of an irresistible humor; the *Voyage of Maelduin* and the *Battle of Moy Rath.*

Early Christian Period.—With the coming of Christianity eame a new phase of Gaelic literature. Saint Patrick and his followers found a soil ready to reeeive the seed of Christianity. Theirs was a bloodless eonquest, and although the Bardie Sehools struggled long against the innovation of Christianity they at length sueeumbed and the subsequent literature of Ireland is thoroughly Christian and largely devotional in tone. Saint Patrick himself was a man of works rather than a man of letters, and yet it is to him that the earliest literature of Christian Ireland and, if we except the Ogam inseriptions the earliest authentie writings now in existenee can be traeed. Of the *Canon Phaidraig,* or *Patrick's Testament,* a MS. eopy of the late 8th or early 9th century is still in existenee, and this, it has been demonstrated, was made from an older copy in the Saint's handwriting. The authenticity of *Saint Patriek's Confession,* whieh, strietly speaking, is not a eonfession, but an apology, has been questioned, but it is vouched for by sueh eminent authorities as Stokes, Todd, and Hyde. These two works, it is true, are in Latin and might be excluded from a consid-

eration of purely Gaelic literature, but as they are the first literary utterance of Christian Ireland, they are worthy of note, despite the alien tongue in which they are written. This objection, however, does not apply to the *Epistle to Coroticus* and *The Cry of the Deer*, two compositions in Gaelic which are also attributed to Saint Patrick. Seachnall, a nephew of the great apostle, is looked upon as the first Christian poet in Ireland, although he, too, wrote in Latin.

Biography, chronicle-history and genealogy make up a large part of the remains of Gaelic literature and, as might be expected from the fervor with which the Irish adopted Christianity, the literature of this period is rich in lives of the saints. It is appropriate, too, that among the earliest we should find lives of Saint Patrick. The *Book of Armagh* contains two very early biographies. There are many others, but the most important is the *Tripartite Life*, the MS. of which, written in ancient Gaelic, was discovered by O'Clery, one of the 'Four Masters,' early in the 17th century. Saint Columcille (521-597), after Saint Patrick the most renowned of the early churchmen, contributed generously to the Gaelic literature of this period. His Gaelic poems voice an ardent patriotism, those written after his exile to Iona especially breathing a passionate love for the land of his birth. The same century that knew Saint Columcille boasts of another great churchman and writer, Saint Brendan the Navigator, founder of the famous abbey and school of Clonfert. Saint Brendan is the reputed author of the *Navigatio Brendani*, a tale of marvellous romance, the influence of which was felt throughout Europe. MS. copies of it may be found in many monasteries on the continent, and it has been edited and annotated in many tongues. Giraldus Cambrensis (1146?-1220?) alludes to it as being well known in his time. The life of Saint Brendan in the *Book of Lismore* tells of his setting out in three vessels in search of an isle in the west which was to be a land of promise, probably the Moy Mell and Hy Brassil of the ancient pagan legends.

But it must not be supposed that the making of literature in Ireland was confined to the churchmen. The arts of poetry and prose composition flourished after, as before the coming of Christianity and the race of bards did not die out for many centuries. Notable among those who flourished prior to the period of the Danish incursions was Eochaidh, better known as Dallan Forgaill, a contemporary of Saint Columcille. He was Chief Ollamh of Ireland, a dignity which on his death devolved on his pupil, Senchan Torpeist. Others, equally as important, were Cernfacladh (c. 678) and Angus Céile Dé, or the Culdee. The *Saltair na Rann*, a collection of 162 poems in Early Middle Gaelic, giving a rather fanciful account of the creation of the world and the fall of Adam and Eve, was long attributed to Angus, but later research by Whitley Stokes has shown that it could not have been written earlier than 1000.

GAELIC LITERATURE.

Danish Occupation to Norman Invasion.—Despite the continual warfare and waste of life and property that marked the two or three centuries of Danish occupation of Ireland, literature and learning flourished. Cormac mac Culinan (d. 908), king, and bishop of Cashel; statesman, ecclesiastic, poet and scholar, is the most eminent figure at this stage of Gaelic literary development. *Cormac's Glossary* is the earliest attempt at a comparative vernacular dictionary made in any language of modern Europe. It is valuable not only as an example of early scholarly effort, but also for the light it throws on pagan customs, on law, history and romance. The *Saltair of Cashel*, also the work of Cormac, has been lost. Others of lesser fame have left examples of their work, the most noted of them being Cinaeth O'Hartigan, Eochaidh O'Flynn and Mac Liag, bard to King Brian Boroimhe, the monarch who in the decisive battle of Clontarf (1014) defeated the Danes and broke forever their power in Ireland. Mac Liag and Errard mac Coise are credited with the joint authorship of the valuable chronicle, *The Wars of the Gael with the Gaill* (i.e., Norsemen), the accuracy of which has withstood some very remarkable tests of modern scholarship. Clontarf saw the end of the Scandinavian power in Ireland, and the 11th and 12th centuries witnessed a great revival of learning. The industrial arts, architecture, letters all flourished, and it is to this period that we are indebted for the three most important relics of Celtic literature now in existence: the *Leabhar na h-Uidhre*, the *Book of Leinster* and the *Book of Hymns*. Tighearnach, Abbott of Clonmacnois, the great annalist, and Flann, head-teacher of the school of Monasterboice, chronologist and poet, are the most eminent individual figures. Irish scholars travelled to the continent and left the impress of their learning on many a European school.

Arrest of Development and Subsequent Revivals.—With the Norman invasion in 1169 came the arrest of development. Hitherto wars, whether between the septs or with foreign invaders, did no lasting injury to the intellectual or æsthetic development of the race, but with the coming of the Normans began a period of decay that lasted for four centuries. The tradition of poetry was kept alive, but no great names illumine the record, and it is not until the beginning of the 17th century that we find a reawakening of the literary spirit. With this period came the last great outburst of classic Gaelic poetry. Teig mac Daire is looked upon as the last of the classic poets and the greatest of his time, although Lughaidh ua Clerigh, with whom he engaged in a notable controversy ('The Contention of the Bards'), is also conspicuous for the merit of his poetry. Others whose work has survived were Teig Dall O'Higin and Eochaidh O'Hussey.

Among the chroniclers of the 17th century we find men of acknowledged learning and skilled in antiquarian research, such men as Brother Michael O'Clery, the learned

Franciscan, who compiled the *Reim Rioghraidhe* ('Succession of Kings') and the *Leabhar Gabhala* ('Book of Invasions'); and who, with O'Mulconry, O'Duigenan and Peregrine O'Clery, compiled that greatest of all mediæval Irish chronicles, the *Annals of the Four Masters*. This work, covering the whole field of Irish history, legendary and authentic, is the most comprehensive and exhaustive record of the kind in the language. Others equally eminent were Duald mac Firbis, the genealogist; and Geoffrey Keating theologian, poet and historian, whose *History of Ireland* is a model of Gaelic prose. Keating, in one sense the greatest of these, was the first to depart from the dialect of the learned, the ancient bardic idiom, and write in a popular style. All his predecessors were learned men writing for the learned few; he, a learned man writing for the many. His history was the most popular book ever written in Gaelic. In his poetry, as in his prose, he was an innovator and was the first to depart from the ancient metres.

The metrical systems of the old bardic schools were intricate and elaborate and, technically, had reached an advanced stage of development centuries before. With the breaking up of the bardic schools in the 17th century came the introduction of a new verse-form in which accent and not syllable was the unit of measure and in which vowel rime took the place of consonantal. The change was almost instantaneous and with the introduction of the simpler form the whole nation seemed to burst into song. The new method was elaborated and developed until the rime affected every accented syllable in the line, with a result that was wonderfully melodious. 'The Gælic poetry of the last two centuries both in Ireland and in the Highlands,' says Hyde *Literary History of Ireland* (1903, p. 542), 'is probably the most sensuous attempt to convey music in words, ever made by man. It is absolutely impossible to convey the lusciousness of sound, richness of rhythm, and perfection of harmony, in another language. Scores upon scores of new and brilliant metres made their appearance.'

Eighteenth Century and After.—The 18th century was a period of persecution, and with the means of education and the opportunities for bettering themselves denied them, the Irish people found an outlet for their feeling only in song. The number of poets produced is almost countless, but a few names, such as David O'Bruadar, John O'Neaghtan, Torlogh O'Carolan, Tadhg Gaoloch O'Sullivan, Donough Mac Conmara, and Brian Mac Giolla Meidhre, are worthy of special mention. But with the 18th century the history of Gaelic literature practically ends. Through the early years of the 19th century the struggle to preserve it was kept up, but the famine, coming as the climax of a long series of calamities, put an end to it. Such men as O'Curry, O'Donovan, Petrie, and Todd; such societies as the Ossianic Society and the Society for the Preservation of the Gaelic Language, la-

bored for the salvation of the tongue, but it was not until the great popular movement of the last two decades of the century that any real progress was made. The Gaelic League has during that time stirred the nation to a sense of its impending loss and as a result the study of the language has been taken up with enthusiasm not only in Ireland but in the United States, South America and Australia. Although this movement, which is purely popular and patriotic and has for its object the restoration of the language and the literature, is distinct from the scholarly interest shown by such scholars as Zeuss, Zimmer, Kuno Meyer, Windisch, D'Arbois de Jubainville, Whitley Stokes, yet its indebtedness to the researches of these investigators is unquestionable. That indebtedness is greater, however, to men like Dr. Douglas Hyde, Dr. Sigerson, Rev. Eugene O'Growney, Rev. P. J. Dineen, Rev. Peter O'Leary and others, who couple with thorough scholarship an enthusiasm that makes their efforts doubly effective. Dr. Hyde is a poet of undoubted gifts, with a command of Gaelic and the intricacies of its metres as sure as is his command of English, and a prose writer of equal fluency in both languages. Father O'Growney's series of text-books is the standard course in most of the classes, and the others have contributed generously to the product of the new school.

Bibliography.—Hyde, *A Literary History of Ireland* (3d ed. New York and London 1903); *Love Songs of Connaught* (London 1895); *Religious Songs of Connaught* (Dublin 1906); Joyce, *Ancient Social Ireland* (2 vols. London and New York 1903); Stokes and Strachan, *Thesaurus Palæhibernicus;* Sigerson, *Bards of the Gæl and Gall* (London 1907, 2d ed.); Stokes, *Irish Lives* and *Three Middle Irish Homilies;* Thurneysen, *Mittelirische Verslehren;* Stokes and Windisch, *Irische Texte* (Leipzig 1881-1900); O'Grady, *Silva Gadelica* (London 1802). Numerous texts can be found in the *Revue Celtique,* the *Zeitschrift fur Celtische Philologie,* the *Anecdota Oxoniensia,* and the Irish Text Society, the Irish Archæological Society, the Celtic Society and the Royal Irish Academy.

GAETA, *gâ-ā'tâ* (Cajeta of the Latins): strongly fortified maritime town of s. Italy, province of Caserta; picturesquely situated on an abrupt promontory projecting into the Mediterranean, and connected with the mainland by a low and narrow isthmus protected by solid walls. On the summit of the promontory stands the circular tower D'Orlando, said to be the ancient mausoleum of Lucius Munatius Plancus, friend of Augustus. The beauty of the bay of Gaeta, which almost rivals that of Naples, has been celebrated by Homer, Virgil, and Horace. Cajeta, ancient name of Gaeta derived its origin, according to Virgil, from its being the burial-place of Cajeta, the nurse of Æneas. On the dismemberment of the Roman empire, Gaeta became a centre of civilization and commercial prosperity, and gained still more importance

after the decadence of the eastern empire. In the growth of this early municipality was foreshadowed the commercial life and grandeur of the later Italian republics. Both in ancient and modern times, Gaeta has sustained remarkable sieges, and recently it has been the theatre of several interesting events. In 1848, it become the refuge of Pope Pius IX., when the revolution at Rome compelled him to retire. In 1860 after the defeat of the Neapolitans on the Volturno by the forces of Garibaldi, Gaeta was the last stronghold of the Bourbon dynasty of Naples, and after a protracted siege surrendered to Gen. Cialdini. Many interesting classic remains have been found in Gaeta, including a fine marble vase by the Athenian sculptor Salpione. The vicinity abounds in remains of Roman villas, etc. The citadel, which is of great strength, contains in its tower the tomb of the Constable Bourbon, killed at the taking of Rome 1527. The inhabitants of Gaeta derive their chief profits from the fisheries and their coasting-trade in oil, wine, and fruit—principal productions of the surrounding country. Pop. abt. 18,000.

GÆTULIA, *jē-tū'lĭ-a:* ancient country of Africa, s. of Mauritania and Numidia, and embracing the w. part of the desert of Sahara. Its inhabitants belonged to the great aboriginal Berber family, of n. and n.w Africa; they were not in general black, though a portion of them dwelling in the extreme s., toward the Niger, had approximated to this color through intermixture with the natives and climatic causes, and were called *Melano-gætuli,* or 'Black Gætulians' (see Ptol. iv. 6, s. 16). The Gætulians were savage and warlike. They came into collision with the Romans for the first time during the Jugurthine war, when they served as light-horse in the army of the Numidian king. Cornelius Cossus Lentulus led a force against them, and for his success obtained a triumph and the surname of Gætulicus (A.D. 6). The ancient Gætulians are believed to be represented in modern times by the Tuaricks or Tawâreks.

GAFF, n. *găf* [Dan. *gaffel;* Ger. *gabel,* a fork; OF. *gaffe,* an iron hook, a boat-hook; Ir. *gaf,* a hook]: in a ship or boat, spar or a sort of boom to which the head of a fore-and-aft sail is bent, such sail having its foremost side made fast by rings to the mast, and its lower edge, in most instances, held straight by the boom proper. The thick end of the gaff is constructed with 'jaws' to pass half round the mast, the other half being inclosed by a rope or wire; this serves to keep it close when the sail is hoisted or lowered. The jaws are usually made by fastening two pieces of wood by means of bolts to the thick end of the gaff, the forward side of these pieces being hollowed out in the form of a semicircle so as to fit snug to the mast but sufficiently loose to allow of free play for the hoisting and shifting of the sail. Lately these jaws have been made entirely of metal, chiefly bronze. The after end of the gaff is called the

'peak' because it is usually raised much higher than the jaws when the sail is set. The ropes used in hoisting and lowering the gaff are called 'halyards,' the rope for raising the peak being designated the 'peak-halyard' and that near the 'jaws' or 'throat' the 'throat-halyard.' 'Spankers' and 'trysails' are the only ones which have gaffs in square-rigged ships but these gaffs do not ordinarily lower or hoist and in place of jaws have eyelets holding the forward end to the mast or to a traveler working on a batten to the mast. The latter method, however, is preferable as the gaff may be lowered when the sail is reefed. *Gaff* denotes also a long hook used for landing salmon: V. to land a salmon with such a hook. GAFFING, imp. GAFFED, pp. *găft.*

GAFFER, n. *găf'fér* [a probable contr. of *goodfather* or *grandfather:* prov. Eng. *gramfer*]: a word formerly applied to an aged man in humble life; a name given to a foreman or oversman.

GAFFLES, *găf'lz:* the levers by means of which crossbows were bent.

GAG, n. *găg* [imitative of sounds uttered while suffering from an impediment or imperfection in the organs of speech: Swiss, *gaggen,* to stutter: Gael. *gagach,* stuttering—from *gag,* an impediment]: something put into the mouth to hinder speaking: V. to hinder speaking by thrusting something into the mouth, or in any other way. GAG'GING, imp. GAGGED, pp. *găgd.* GAG-REIN, n. rein attached to the throat-latch, to draw the bit up into the corners of the horse's mouth when pulled upon. GAG-TOOTH, a projecting tooth.

GAG, n. *găg* [Gael. *gag,* a chink, an opening, an impediment]: in *slang,* certain words introduced by an actor in a theatre into his part to suit a particular purpose, as to pander to some popular fashion or folly.

GAGE, n. *gāj* [F. *gage,* a pledge—from mid. L. *vădĭ-ŭm,* pawn or pledge; allied to *wage, wager*]: a pledge or security; a glove or cap, etc., thrown to the ground as a pledge to sustain an affirmation or a cause, as a 'wager of battle,' or as a challenge—to be redeemed by mortal combat: V. to pledge; to wager. GA'GING, imp. *-jĭng.* GAGED, pp. *-gājd,* pledged; bound. ESTATE IN GAGE, in old English law was of two kinds: *vivum vadium* (the most ancient), where an estate in land was given to a lender as security, to remain in his hands till he had made good the sum lent from the profits of the land (see WADSET): and *mortuum vadium* (mort-gage). See MORTGAGE.

GAGE, in *weather gage:* the windward of a ship. See WEATHER-GAGE.

GAGE (to measure). See GAUGE.

GAGE, *gāj,* LYMAN J.: statesman: b. at De Ruyter, Madison co., N. Y., 1836, June 28. 'He was educated at Rome Acad. 1846-50, entered the Oneida Central Bank

as clerk 1853, and in 1855 worked in a Chicago lumber yard. In 1858, he became bookkeeper of the Merchants' Savings, Loan, and Trust Co., Chicago, and rose to cashier 1861. In 1868, he entered the First National Bank of Chicago as cashier, and was appointed president of that institution 1891, July 1. He was first president of the Columbian Exposition Company 1890, and of the Chicago Civic Federation, which led to municipal reform, 1894-5. In 1897 President McKinley appointed him sec. of the treasury of the United States, but he resigned in 1902.

GAGE, *gāj*, THOMAS: English general: d. 1787. In 1760 he became gov. of Montreal, and 1763 commander-in-chief of the British forces in America. His inflexible character led the govt. to regard him as well fitted to end the disturbances in the American colonies. In 1774, he was nominated gov. of Massachusetts, a post of peculiar difficulties. Appointed to carry out those rigorous decrees of parliament which ultimately alienated the colonies from the mother country, he proceeded to enforce them, but in such a manner as only tended to widen the gulf of separation, and drive matters to a climax. 1775, Apr. 18, he despatched an expedition to seize a quantity of arms stored at Concord, Mass. On the way thither the detachment came upon a number of militia drilling, whom they attacked because they refused to lay down their arms. This encounter, known as the battle of Lexington, was the signal for a general rising throughout the states. On June 17 the battle of Bunker Hill was fought, which resulted in a dearly bought victory to the English; but numerous complaints being lodged against Gage, he was recalled by the British government 1775, Oct. He then returned to England, where he died.

GAGEA, n. *gāj'ė-a* [named after Sir Thos. *Gage*, a British botanist]: genus of *Liliaceæ*, tribe *Tulipeæ*.

GAGERN, *gâ'gėrn*, HEINRICH WILHELM AUGUST, Freiherr VON: 1799, Aug. 20—1880, May 22; b. Baireuth. He was educated in Munich and studied law at Heidelberg, Göttingen, Jena, and Geneva. He was elected a member of the second chamber of the Grand Duchy of Hesse 1832, and vigorously opposed the politics of the governments and of the federal diet. In 1836 he declined re-election, and turned to agriculture. In 1846, Gagern published a work against the govt. of electoral Hesse, and was re-elected to the chamber as representative of Worms 1847. His return to public life gave great impulse to liberal politics, and he became inseparably connected with the German movement of 1848. He endeavored to promote the representation of the German people in the Frankfort diet; was the most prominent delegate in the preparatory convention (*das Vorparlament*) from the German states at Frankfort, Mar. 31; and on the meeting of the parliament, May 28 (see GERMANY), he was appointed president, and later to the perpetual presidency. Gagern, unable to sympathize with the violence of the

democratic party, and to agree with the governments, abandoned the movement 1849, May 20. In 1850 he served in the Slesvig-Holstein war, after which he retired to the Monsheim estate, which had come into his possession. In 1852, he removed to Heidelberg and published the life of his brother, Gen. Friedrich von Gagern.

GAGGLE, v. *găg'l* [Dut. *gaggelen;* Ger. *gackeln*, to make a noise, as a goose]: to make a noise like a goose. GAG'GLING, imp. *-glĭng:* ADJ. silly; noisy and foolish. GAGGLED, pp. *găg'ld.*

GAG-RULES, a series of rules adopted 1836-44 by the House of Representatives, to prevent the reception of anti-slavery petitions and check the possibility of debate on the subject. No other measure created more virulent debate. The Constitution forbids Congress to pass any law 'abridging the right of the people to petition the government for a redress of grievances,' and impliedly to refuse to receive petitions, as an unheard petition is a nullity. From 1831 on, the abolition societies rained petitions on Congress, urging the abolition of slavery in the District of Columbia, over which it had complete legislative power. They were referred to the committee on the District, which at first reported adversely, then ceased to report at all, despite complaints. The 24th Congress, 1835-6, laid them on the table instead; but in both Houses there soon arose an outcry to bar them from congressional cognizance altogether. In the Senate, Calhoun in 1836, Jan. 7, moved not to receive two such petitions, on the ground that the South must in the end be worn out and degraded by having constantly to justify its institutions, before a body which had no jurisdiction over them anywhere; but after two months' debate, it was voted to receive them and they were immediately rejected, which remained the rule thereafter. In the House on February 8, Henry L. Pinckney of South Carolina moved that all the petitions be referred to a select committee, under instructions to report that Congress could not constitutionally interfere with slavery in the States, and ought not to do so in the District; on May 18 the committee so reported, with another resolution that all petitions relating to slavery be laid on the table without action or reference. Under the previous question both resolutions were passed May 25-26; the last 117 to 68, John Quincy Adams refusing to vote and denouncing them as a violation of the Constitution, the rules of the House, and the rights of his constituents. Thereafter Mr. Adams, as the champion of the right of petition, became involved for years in an endless struggle against the 'gag.' In 1837, Jan. 18, this struggle was renewed. The furious scenes in which Mr. Adams was pitted against nearly all the rest of the House are among the most picturesque in American history. In 1837, Dec. 21, John M. Patton of Virginia moved and secured the passage (122 to 74) of a resolution to lay on the table

without debate, reference, or action, all papers concerning slavery in any State, 'District or Territory' of the United States. Adams again denounced it and refused to vote. In 1838, Dec. 11, the 'Atherton Gag' was moved by Charles J. Atherton of New Hampshire, and passed 126 to 73; it was the same in essence as the others. In 1840, Jan. 21, the House adopted as its 21st Rule that no paper praying the abolition of slavery or the slave trade should in future be received by the House or entertained in any manner. But this only passed by 114 to 108; the refusal of the right of petition was incensing the North, and foreing even Democratic representatives to protest. Thereafter at every session, in adopting the rules, Mr. Adams moved to strike out the 21st; the violence of the assaults on him increased, but the majorities against him decreased. At the special session of 1841 his motion was carried on a motion to adopt the rules only for 10 days, but reconsidered and defeated. Finally, in 1844, Dec. 3, a motion to lay his motion on the table was lost by 104 to 81, and the 21st Rule was abolished by 108 to 80. Nothing of the kind was again attempted. Since 1853, Dec. 12, petitions are no longer presented in the House, but handed to the clerk.

GAIANITES, n. *gā'an-īts:* in *chh. hist.*, branch of the Eutychians, followers (about 537) of Gaian, Bp. of Alexandria.

GAIETY and GAILY. See under GAY.

GAIL HAMILTON. See DODGE, MARY ABIGAIL.

GAILLARD, *gâ-yâr'*, GABRIEL HENRI: 1726, Mar. 26—1806, Feb. 13; b. in the village of Ostel, near Soissons: French historian. He was educated for the bar, but soon turned to literature, and later to history exclusively. His first work was *Essai de Rhétorique Française à l'Usage des jeunes Démoiselles*, etc. (1745); followed by *Poétique Française à l'Usage des Dames.* In 1757 appeared *Histoire de Marie de Bourgogne, Fille de Charles le Téméraire;* 1766, *Histoire de François I.;* 1782, *Histoire de Charlemagne, précédée de Considérations sur la première Race, suivie de Considérations sur la seconde Race, et contenant l'Éloge du Premier Presiden de Lamoignon.* His *Histoire de la Rivalité de la France et de l'Angleterre* (1771-77) (which procured his admission into the French Acad.), and *Histoire de la Rivalité de la France et de l'Espagne*, are deemed by English critics, diffuse, one-sided, and rhetorical. Gaillard was author of many other works.

GAILLARDET, *gâ-yâr-dā*, THÉODORE FRÉDÉRIC, French dramatic author: b. Auxerre, 1808, April 7; d. Plessis-Bouchard 1882, Aug. 12. He practised law at Tonnerre. He sent a drama to the Porte Saint-Martin, which partly rewritten by Alexander Dumas, the elder, and signed by him, achieved an enormous success as *La Tour de Nesle*, 1832, May 28. This led to a duel with Dumas, Gaillardet afterward gaining a lawsuit which permitted him to place

his name as one of the authors of the piece. He is the author of two other plays, *Struensee ou le Medecin de la Reine* (1832), and *Georges ou le Criminel par Amour* (1833). He also wrote from private papers found at Tonnerre, and the archives of foreign affairs, the *Memoires du Chevalier d'Eon* (1836, new edition 1866). Coming to New York in 1839 he founded the *Courrier des Etats Unis*, a French newspaper which he edited until 1848 and which is still published. He returned to France later and served on the editorial staff of the *Presse*.

GAILOR, Thomas Frank, American Protestant Episcopal bishop: b. Jackson, Miss., 1856, Sept. 17. He was graduated from Racine College, Wis., in 1876, and from the General Theological Seminary, New York, in 1879. Entering the ministry he was rector of the Church of the Messiah, Pulaski, Tenn., 1879-82; and in 1882 became professor of ecclesiastical history in the University of the South, Sewanee, Tenn. In 1893 he was consecrated bishop-coadjutor of Tennessee, and in 1898, on the death of Bishop Quintard, became bishop of Tennessee. His writings include: *A Manual of Devotion; The Apostolical Succession; Things New and Old; The Trust of the Episcopate.*

GAILLONELLA, n. *gāl-lo-nĕl'la* [named after the algologist *Gaillon*]: genus formerly held to belong to the infusoria, but now ranked with plants.

GAIN, n. *gān* [Icel. *gagn*, gain, advantage: Sw. *gagn*, benefit, profit: OF. *gaagner;* F. *gagner*, to gain or earn—applied primarily to what was obtained from the ground by labor or by the feeding of cattle: Prov. *gaanh*, gain, profit: comp. Gael. *gin*, to generate, to cultivate]: profit; advantage obtained; interest; V. to get, as profit or advantage; to obtain by effort; to procure; to have profit or advantage; to reach or arrive at. Gain'ing, imp. Gained, pp. *gānd.* Gains, n. plu. *gānz*, earnings, etc. Gain'ful, a. *-fûl*, profitable; advantageous. Gain'fully, ad. *-lĭ.* Gain'fulness, n. Gain'giving, n. *-gĭv-ĭng*, in *OE.*, return; misgiving. Gain'less, a. bringing no advantage. To gain ground, to advance in any undertaking; to prevail. To gain over, to draw to another party or interest. To gain on or upon, to encroach on; to get the better of.—Syn. of 'gain, v.': to acquire; obtain; win; earn; attain; get; achieve; conciliate; reach; arrive at;—of 'gain, n.': emolument; lucre; advantage; benefit; acquisition; accumulation.

GAINES, *gānz*, Edmund Pendleton: 1777, Mar. 20—1849, June 6; b. Culpeper co., Va.: soldier. He was appointed 2d lieut. 6th U. S. inf. 1799, Jan. 10; promoted 1st lieut. 1802, Apr., capt. 1807; resigned from the army 1811; returned and was appointed maj. 1812, Mar. 24; promoted col. 1813, brig.gen. 1814, Mar. 9; and brevetted maj.gen., and received the thanks of congress and a gold medal for his defense of Fort Erie, 1814, Aug. In 1816 he was appointed a commissioner to treat

with the Creek Indians, 1817 commanded the s. **milit.** dist., and began the operations against the Creek and Seminole Indians which resulted in the acquisition of Fla. by the United States; 1836 was engaged against the Seminoles and was severely wounded. He was active in the early part of the Mexican war.

GAINES, Myra Clark: wife of Gen. Edmund P. Gaines: 1805-1885, Jan. 9; b. New Orleans: litigant. She was a daughter of Daniel Clark, who emigrated from Ireland to New Orleans, and inherited his uncle's property there 1799. He was supposed to have lived a bachelor, but it was known that he was the father of two daughters by a French woman of great beauty. He died 1813, and his will (1811, May 20) gave his property to his mother. From statements of Myra's father to friends declaring her legitimacy and the testimony of others to whom he had shown his will, giving her his property, shortly before his death, the supreme court of La. pronounced her legitimate and his lawful heir 1856, Feb. 18. Subsequently the U. S. supreme court decided that the facts of her father's secret marriage in Philadelphia and her own legitimacy were fully established. Then began the struggle to secure possession of the estate. She filed a bill in equity in the U. S. supreme court 1856, and a favorable decision was rendered 1867. In 1861 the property in New Orleans was valued at $35,000,000, and previous to 1874 she obtained $6,000,000. Appeals and counter suits were in progress at the time of her death.

GAINES'S MILL, Battle of: 1862, June 27; including the engagement at Mechanicsville, or Beaver Dam Creek. Gaines's Mill is about 8 miles northeast of Richmond, Va. After the battle of Fair Oaks (q. v.), or Seven Pines, 1862, May 31—June 1, Gen. McClellan pushed the construction of bridges across the Chickahominy, which were completed by June 26, at which time he had 115,000 men present for duty, 92,000 of whom were on the south side of the river, Gen. Fitz John Porter, with about 23,000 men being on the north side. On the 25th McClellan advanced a part of his line preliminary to a general advance on Richmond. But he was immediately thrown upon the defensive by news of the approach of Gen. 'Stonewall' Jackson to his right and rear. Gen. Lee, who had succeeded to the command of the Army of Northern Virginia, upon the severe wounding of Gen. Johnston at Fair Oaks, taking advantage of the division of McClellan's army by the Chickahominy, called Gen. Jackson from the Shenandoah Valley to gain Porter's right and rear, and co-operate with the greater part of the army in utterly destroying him, Gen. Magruder with 25,000 men being left in front of Richmond to confront and amuse McClellan's forces south of the river. June 26th Gen. Lee crossed the river near Mechanicsville and attacked Gen. McCall's division, posted along Beaver Dam Creek and was repulsed with great loss, Jackson failing to get up in time to co-operate. The Union loss was 49 killed, 207 wounded, and

105 missing. The Confederate loss was very great, Longstreet says between 3,000 and 4,000, and that next to Malvern Hill it was to the Confederates the most demoralizing battle of the summer. It was the first of 'The Seven Days' Battles.' Early next morning McCall's division was ordered withdrawn and Porter took up a defensive position near Gaines's Mill east of Powhite Creek, a small stream flowing into the Chickahominy. Porter's line was crescent shaped, covering several bridges over the Chickahominy, the left resting on the low ground near the river, the right turning around south of Old Cold Harbor. It was a strong line and well entrenched, but Porter's command was too small to properly man it. Porter had been directed by McClellan to hold the position to the last extremity, and assured that he would be properly supported. When it was discovered that McCall was withdrawing from Beaver Dam Creek, the Confederates gave immediate pursuit, the divisions of A. P. Hill and Longstreet from the west, Jackson's and D. H. Hill's from the northwest. At noon there was a sharp engagement at Gaines's Mill between Gregg's South Carolina brigade of A. P. Hill's division, and the 19th Massachusetts regiment, in which the regiment contested the ground so stubbornly that Hill was held in check until 2 P.M., when, Longstreet, Jackson, Ewell, and D. H. Hill coming up, A. P. Hill again advanced and assaulted the left of Porter's line, being repulsed with great loss. Longstreet went to the relief of A. P. Hill, and Jackson and D. H. Hill moved on Porter's right, and the fighting was furious all along the line, causing Porter to throw in all his reserves and call upon McClellan for help. Gen. Slocum with a division of Franklin's corps, came on the field from beyond the Chickahominy, about 4 P.M., and his three brigades were separated and assigned to positions in the weak parts of the line, and by 5 P.M., the Confederates were everywhere repulsed, and about this time the brigades of French and Meagher of Sumner's corps were crossing the Chickahominy to Porter's support. But the Confederates had now all closed up, and a combined and furious attack was made by them all along Porter's line, which soon gave way, leaving 22 guns and over 2,000 prisoners in the hands of the enemy. Confederate pursuit was checked by the timely arrival and assistance of French's and Meagher's brigades. While Porter was thus heroically fighting on the north side of the river with about 30,000 men facing about 57,000 led by Lee, McClellan with 80,000 men had been held in check on the south side by Gen. Magruder with 25,000, Magruder's feints and demonstrations being of such a character that McClellan believed Lee with 100,000 men to be between him and Richmond. During the night the Union troops on the north side of the Chickahominy were withdrawn to the south bank, the bridges were destroyed, and with the rest of the army began the retreat to Harrison's landing on James River. The number of Union troops engaged at Gaines's

Mill from first to last was about 34,000, against 57,000 Confederates. The Union loss was 894 killed, 3,107 wounded, and 2,836 missing, an aggregate of 6,837. It is estimated that the Confederate loss was 8,751.

GAINESVILLE, Ga.: city and county-seat of Hall co.; on the Richmond and Danville and the Georgia railroads; 53 m. n.e. of Atlanta. It is located on the summit of the Chattahoochee ridge, the watershed between the Gulf of Mexico and the Atlantic Ocean. In 1903, June 1, this city and adjacent territory were swept by a tornado which killed 100 persons and destroyed over $500,000 worth of property. Pop. (1900) 4,382; (1910) 5,925.

GAINESVILLE, Texas, city and county-seat of Cooke co., on the Missouri, K. & T., and the Gulf, C. & S. F. R.R.'s., 65 miles north of Fort Worth. This is the centre of an important agricultural and stock-raising district. It has large meat-packing establishments and manufactures of flour, foodstuffs, cotton-seed oil, carriage works, hide and leather factories, and pressed-brick works. The town was first settled in 1851, and was incorporated in 1873. It was governed under a new charter in 1879 with a mayor and council elected by popular vote every two years. Pop. (1900) 7,874; (1910) 7,624.

GAINSAY, v. *gān'sā* [AS. *gean;* Icel. *gegn;* Ger. *gegen,* against, and *say*]: to speak against; to contradict; to oppose in words. GAIN'SAYING, imp. GAIN'SAID, pp. *-sād,* contradicted. GAIN'SAYER, n. *-sā-ėr,* one who; an opposer.

GAINSBOROUGH, *gānz'bŭr-ŭh* or *-b'ro,* THOMAS: 1727-1788, Aug. 2; b. Sudbury, Suffolk, England: eminent landscape-painter. He early showed talent for painting. 'Nature,' it has been said, 'was his teacher, and the woods his academy, where he would pass his mornings alone, making sketches of an old tree, a marsh, brook, a few cattle, a shepherd and his flock, or any other objects that casually came in view.' At 14 years of age he was sent to London, where he was for some time with Gravelot, the engraver, and afterward with Hayman. At 19 he married, and set up in Bath as a portrait-painter, and was very successful; but his genius found its first adequate expression in the delineation of the rich and quiet scenery of his native country, and to this mainly he applied himself after leaving Bath for London, 1774. On the institution of the Royal Acad., Gainsborough was chosen one of the first members, but never took much interest in its proceedings. His last words in dying, enthusiastic utterance of the artist rather than a dictum in theology, were, 'We are all going to heaven, and Vandyck is of the party.'—Gainsborough's portraits are remarkable as 'striking likenesses,' but are not carefully finished. The best are those of the Royal Family, of Abel the composer, and Quin the actor. His fame rests chiefly on his landscapes; in these he shows himself a faithful adherent to nature, as he knew it in his own England. He is to be regarded as the first truly original English

painter, and, in the opinion of Sir Joshua Reynolds, fit to be the head of an English school. Among his finest productions are, *The Shepherd's Boy*, *The Fight between Little Boys and Dogs*, *The Seashore*, and *The Woodman in the Storm*. His most celebrated picture is *The Blue Boy*, in the Devonshire Gallery.

'GAINST, contr. for AGAINST.

GAINSTRIVE, v. *gān'strīv* [*gain*, and *strive*]: in *OE.*, strive against; to make resistance.

GAIRDNER, *gārd'nėr*, JAMES, English historian: b. Edinburgh, 1828, March 22. At 18 as a clerk he entered the *Public Record* office in London, where he became assistant keeper in 1859. He has distinguished himself by the rare combination of profound erudition, patient accuracy, and judicial temper which he has shown in the editing of a long series of historical documents: *Memorials of Henry VII.* (1858); *Letters and Papers Illustrative of the Reigns of Richard III. and Henry VII.* (1861-3), in the Rolls series; the continuation from Vol. V. onward of the late Prof. Brewer's *Calendar of Letters and Papers, Foreign and Domestic, of the Reign of Henry VIII* (9 vols. 1862-86); and *Historical Collections of a London Citizen* (1876), and *Three Fifteenth-Century Chronicles* (1880), for the Camden Society series. Equally valuable are the books addressed to a wider audience: an edition of the *Paston Letters* in Arber's series (1872-5); *The Houses of Lancaster and York*, in *Epochs of Modern History* (1874); *Life and Reign of Richard III.* (1878); *England* in *Early Chroniclers of Europe* (1879); *Studies in English History* (1881), a series of essays written in conjunction with Spedding; and *Henry VII.*, *Statesmen* series (1889).

GAIRDNER, SIR WILLIAM TENNANT, Scottish pathologist: b. Edinburgh, 1824, Nov. 8. He was graduated M.D. at Edinburgh in 1845, and from 1862 until his retirement in 1900 occupied the chair of practice of medicine in Glasgow University. Among his published books are: *Pathological Anatomy of Bronchitis and Diseases of the Lungs* (1850); *Notes on Pericarditis* (1851); *Clinical Medicine* (1862); *Public Health in Relation to Air and Water* (1862); *On Some Modern Aspects of Insanity; Lectures to Practitioners* (1888); *The Physician as Naturalist* (1889).

GAIRISH, or GARISH, a. *gär'ĭsh* [OE. *gaure* or *gare*; Swiss, *glare*, to stare]: unduly or tastelessly fine; staring; glaring; showy; extravagantly gay; in *OE.*, flighty. GAIR'ISHLY, ad. *-lĭ*, splendidly; gaudily. GAIR'ISHNESS, n. finery; flaunting gaudiness. *Note.*—OE. *gare*, and Eng. *gaze*, are modified forms of *garish:* comp. Gael. *gair-theas*, the glittering reflection of the sun's rays from water or a polished surface.

GAISFORD, THOMAS, English scholar and Greek philologist: b. at Ifort, Wiltshire, England, 1779, Dec. 22;

d. 1855, June 2. He was educated at Christ Church, Oxford, took orders in the Church, and in 1811 was appointed regius professor of Greek in the University of Oxford. In 1831 he became dean of Christ Church, remaining such till his death, and in 1847 rector of Westwell and curator of the Bodleian Library. He was a prolific writer, his principal works being: *Hephæstronis Enchiridion de Metres* (Oxford 1810; Leipsic 1832); *Poctæ Græci Minores* (1814-20, 4 vols.); *Stobæi Florilegium* (1822, 4 vols.); *Herodoti Historiæ* (1824); *Sophoelis Tragœdiæ* (Oxford, 1826, 2 vols.; Leipsic 1827, 8 vols.); *Suidæ Lexicon* (1834, 3 vols.); *Paræmiographi Græci* (1836); *Scriptores Latini rei Metricæ* (1837); *Entymologicum Magnum* (1848); and *Eusebii Demonstratio Evangelica* (1852, 3 vols.). He was elected a member of the Institute of France, and in 1856 the Gaisford prize, for Greek Composition, was founded at Oxford in his memory.

GAIST-COAL, n. *gāst'kōl* [*gaist*, a ghost]: a piece of dead coal, that instead of burning appears in the fire as a white lump.

GAIT, n. *gāt* [Dan. *gade*, a street: Icel. gata, street, path: Sw. *gata*, a street, a way]: manner and air in walking; walk or march; carriage. GAITED, a. *gāt'ĕd*, having a particular manner of walking.

GAITERS, n. plu. *gā'tėrz* [F. *guestre* or *guêtre*]: coverings of cloth for the legs and ankles, coming down over part of the shoe; a kind of shoe.

GAITIN, n. *gāt'ĭn*, or GAITING, n. *gāt'ĭng:* in *Scot.* and *prov. Eng.*, the setting up of quantities of damp grain to dry, afterward to be bound into sheaves; the setting up of single sheaves for drying.

GAIUS, *gā'yŭs:* Roman jurist: probably of the age of the Antonines, and the chief source of our knowledge of Roman law prior to Justinian. Considering the important place which he holds in ancient legal literature, it is strange that his personal history should be almost entirely unknown, and that nearly every circumstance connected with him should be a subject of controversy. The discussion as to whether the name is properly *Gaius* or *Caius* is a mere verbal dispute; but the questions regarding his country, his condition, and even his religion, have been canvassed at considerable length. From his being uniformly called by the single appellation Gaius, it has been inferred that he was either a foreigner or a freedman: from his familiarity with the Greek language, same have argued that he was of Greek origin; from his being cited as 'our' Gaius by Justinian, native of Illyricum, it is argued by some that Gaius must have been an Illyrian by birth; while others, arguing from the same fact, and equally inconclusive data, have even set him down as a Christian. That the last inference is a mistake is nearly certain. As to the date of Gaius, this is known, that before the revision of the Roman laws, and the re-

form of the legal studies by Justinian, the *Institutions* of Gaius, as well as four other of his treatises, were the received text-books in the schools of law. His *Institutions*, moreover, formed the groundwork of the *Institutions* of Justinian. From his being thus preferred to Ulpian or Papinian, it is not to be inferred that he lived after them, but only that his work was more popular. The latest jurist whom he cites is Salvius Julianus, who lived under Hadrian, and the latest imperial edict one of Antoninus Pius, whence it may fairly be concluded that he survived Antoninus, and probably wrote under his successor.

The works of Gaius were largely used in the compilation of the *Digest*, which contains no fewer than 535 extracts from his writings. The principal works are the *Edictum Provinciale*, 32 books; the *Aurea*, seven; the *Edictum Urbicum; On Trusts; On Mortgages;* and, above all, the *Institutions*, four books. The last-named work is that by which chiefly Gaius is known, and it was probably the earliest complete and systematic text-book of Roman law. Although it was the basis of Justinian's Institutions, both as to its matter and its division, yet it was completely superseded by that work, and after a time was entirely lost, the only knowledge of it which remained being that which was gathered from the detached extracts in the *Digest*, and from the *Breviarium Alaricianum*, or code of the Visigoths, which was known to be derived from it. The recovery of this long-lost work was remarkable. It had long been known that the MSS. in the library of the chapter of Verona were specially curious in the matter of jurisprudence; and Niebuhr, on his way to Rome, 1816, discovered, in a palimpsest MS., whose later writing was a copy of St. Jerome's epistles, portions of the work of some ancient jurisconsult, the value of which he at once recognized; and a specimen page, as copied by him, was soon pronounced by Savigny a portion of the *Institutions* of Gaius. On the publication of his report, the Berlin Acad. of Sciences commissioned two German scholars, Göschen and Hollweg, 1817, to make a copy of the entire palimpsest, which consists of 127 sheets. It was an immense labor. The original writing had been very carefully washed, and in many pages scraped out; the lines of the second writing did not cross the original, as often happens in palimpsests, but ran in the same direction, and frequently over it; while 63 pages of the palimpsest had actually been written three times, Gaius having been erased to make room for a theological treatise, which in its turn was scraped out to make room for St. Jerome. It is great credit to the skill and patience of the copyists that they succeeded in recovering so much as nine-tenths of the entire work; it was published, 1821, by Göschen, and again, after a fresh collation of the MS. by Blume, 1824; a third, and much improved ed., by Lachmann, appeared 1842. A comparative ed. of the *Institutions* of Gaius and

of Justinian, by Klenze and Böcking, was published, Berlin, 1829.

The *Institutions* of Gaius are divided into four books, of which the first is devoted to the law of persons, the second and third to the law of things, and the fourth to the law of actions. The first book was translated into German, 1824, by Von Brockdorff, and the entire work has been translated into French three times—by Baulet, 1826, by Domenget, 1843, and by Pellat, 1844. In England it has attracted little notice, except in a few of the critical journals, and there chiefly as a literary curiosity; nor has any English translation of the work hitherto appeared.

The *Lex Romana Wisigothorum*, or *Breviarium Alaricianum*, is in substance a recast of the *Institutions* of Gaius, published, 506, by Alaric for the use of the Roman subjects of the west Gothic kingdom. It is curious chiefly as illustrating the analogies and the discrepancies of Roman and barbarian law, and as supplying the germ of many of the mediæval institutions by which Roman practice was supplanted. See, besides editions of the *Institutions* enumerated above, Huschke, *Zur Kritik und Interpretation von Gaius Institutionen*, in his *Studien des Römischen Rechts;* also Mackeldey's *Lehrbuch des Römischen Rechts;* and Savigny, *System des heutigen Röm. Rechts.*

GALA, n. *gā'lă* or *gâ'lă* [It. *gala*, ornament: OF. *gale*, good cheer: Sp. *gala*, a court dress: comp. Gael. *ceòl* =*geòl*, music, melody]: a festival with music; display; splendor. GALA-DAY, a day of pomp, splendor, or festivity.

GALACTIC, a. *gă-lăk'tĭk* [Gr. *gala*, milk, *galaktos* of milk]: connected with or relating to the galaxy or milky-way; of or pert. to milk. GALACTILE, n. *gă-lăk'tĭl*, a mineral, so called from its giving the color of milk when triturated among water. GALACTINE, n. *-tĭn*, nitrogenous substance obtained from milk; found also in blood, gastric juice, animal membranes, eggs, the juices of edible plants, and in the fluid of the embryonal cotyledons. GALAC'TOCELE, n. *-tō-sēl* [Gr. *kēlē*, a tumor]: a tumor formed in the breast during lactation. GALACTOMETER, n. *găl'ăk-tŏm'ĕ-tėr*, or LACTOMETER [Gr. *metron*, a measure]: instrument for indicating the specific gravity of milk, and supposed to show whether water has been added or any portion of the cream removed. It consists of a glass tube on which is a graduated scale, and is so constructed that it will float in a liquid and remain upright. It is really a hydrometer, or areometer (q.v.), with a scale arranged especially for milk. While it shows deviations from the normal specific gravity, it does not prove that milk has or has not been diluted. An unusually large proportion of cream sometimes makes the specific gravity of absolutely pure milk too low for the standard gauge of the galactometer. The

removal of cream from ordinary milk makes it too heavy, but the addition of water restores it to the proper specific gravity. Dilution with water without the removal of cream is not always indicated by the galactometer. Variations in the temperature of the milk also cause a wide difference in the indications of the galactometer. On account of these imperfections the galactometer should be used only in connection with a gauge for determining the percentage of cream, and different samples of milk should be tested at a uniform temperature. To place the question of dilution or adulteration beyond doubt a chemical analysis is requisite. GALACTOPH'OGIST, n. *-tŏf'a-jĭst*, one who subsists on milk. GALACTOPH'AGOUS, a. *-gus*, feeding or subsisting on milk. GALACTIC CIRCLE, the ground-plane of the sidereal system, as the invariable ecliptic is of the planetary system in astronomy: see GALAXY.

GALACTODEN'DRON. See COW-TREE.

GALACTOPHOROUS, a. *găl'ăk-tŏf'ŏ-rŭs* [Gr. *gala*, milk, *galaktos*, of milk; *phorĕō*, I carry]: conveying milk or white juice; applied to certain ducts or canals in the mamma which convey the milk to the summit of the mammilla.

GALACTOSE, n. *gă-lăk'tōs* [Gr. *gala*, milk, *galaktos*, of milk]: a variety of milk sugar or lactose formed by boiling it with dilute acid.

GALACZ, *gâ'lâtch*: important town and river-port of Moldavia; centre of the commerce of the whole Rumanian principality; on the left bank of the Danube, about three m. below the confluence of the Sereth, and 92 m. from its mouth. Galacz occupies a slope stretching gently down to the river, and is divided into an Old and New Town, the former mostly of irregular one-storied houses, the latter built more after the fashion of w. Europe. With the exception of its churches and the residences of the foreign consuls, Galacz has no remarkable buildings. But its dockyard, its large bazaar, its numerous grain-stores, its magazines of eastern wares, and its rich banking establishments are notable. It is the principal emporium for the various produce of the Rumanian side of the lower Danube, which is brought down to Galacz from the interior in bullock-carts, and thence shipped to foreign countries. The only cities on the whole of the great river that have more extensive trade are Vienna and Pesth. The chief exports are wheat, wheat-flour, maize, barley, and rye; also smaller quantities of oats, beans, millet, rape, and linseed. Other articles of produce are soft pine timber and planks, oak staves, tallow, wool, hides, petroleum, spirits, cheese, and salt fish. The increase in the commerce of Galacz after 1850 until 1876, when it ceased to be a free port, quadrupled; the exports reaching an annual value of about $7,300,000, and the imports $9,700,000. The total annual exports since the beginning of the 20th century,

average about $5,100,000, and the imports $10,616,300. Railway communications, improvements in the navigation of the river, increased harbor and dock accommodations, facilitate commerce, and the foreign shipping clearing at Sulina at the mouth of the river on the Black Sea, 92 miles distant, averages annually about 1,500 vessels of 1,500,000 tons. The city has electric lighting and street railroads. Pop. 63,000.

GALAGE, n. *gă-lāj'* [see GALOCHE, GOLOSH]: in *OE.*, a kind of patten or clog fastened with latchets; a coarse shoe; an overshoe.

GALAGO, *ga-lā'gō* (*Galago* or *Otalicnus*): genus of mammalia of the Lemur family, remarkable for the great length of the hind legs, and the great size of the ears, which are membranous and capable of being folded down as in bats. The head is rounded, the muzzle short, the eyes very large; all the feet have five toes; all the nails are flat, except those of the first digits of the hind feet, which are armed with sharp claws; the tail is very long and almost bushy. The species are natives of Africa and Madagascar, varying from the size of a rabbit to that of a rat; more or less nocturnal in their habits; very lively and active; feeding partly on fruits and partly on insects; one of them (*G. Senegalensis*) is known in Senegal as the *gum animal*, from living much in acacias, and feeding, or being supposed to feed, on their gum. 'These pretty animals have all the activity of birds, leaping from bough to bough. They watch insects flitting among the leaves, listen to the fluttering of the moth as it darts through the air, lie in wait for it, and spring with the rapidity of an arrow, seldom missing their prize, which is caught by their hands.' When they leap, they always seize with their hands the branch on which they intend to rest. They make nests of grass and leaves for their young in the branches of trees. They are a favorite article of food in Senegal.

GA'LAM BUTTER. See SHEA.

GALANGAL, n. *găl'ăn-găl* [native name: Sp. *galanga*, a species of arrowroot], (*Alpinia*): genus of plants of nat. ord. *Zingiberaceæ* or *Scitamineæ*, having perennial stems with terminal inflorescence and succulent fruit. The rootstocks have stimulating properties similar to those of ginger. The true Galangal is the produce of *A. Galanga*, native of the Eastern Archipelago, and cultivated there; having a stem six or seven ft. high, broad leaves, and a branched panicle of greenish-white flowers. The root-stock, when young, yields a kind of arrowroot, and is used for food; it acquires pungency and aromatic properties as it becomes older, and was formerly used in medicine. Galangal is in use in the East for the same purposes as ginger.

GALAN'THUS. See SNOW-DROP.

GALAPAGOS ISLANDS, *găl-a-pā'gos* or *gâ-lâ'pâ-gōs*

[from Sp. *galápago*, tortoise]: volcanic group in the Pacific, on or near the equator, long. 89°—92° w. They are 13 in number, the largest measuring 60 m. by 15, with an elevation of 4,000 ft. The islands contain probably 2,000 eruptive volcanic cones, though at present volcanic activity is suspended. They can hardly be said to be peopled, with the exception of three, which are used by the govt. of Ecuador as penal settlements. The fauna and flora of the islands are very peculiar, many of the animals and vegetables being found only here. Reptiles are very numerous. The Galapagos Islands, formerly visited chiefly for their land-tortoises of enormous size and prodigious number, are nearly deserted, as the tortoises are smaller and scarcer. The 10 principal members of the cluster are Albemarle (60 m. long), Indefatigable, Chatham, Charles, James, Narborough, Hood, Barrington, Bindloes, Abingdon.

GALATA, *gâ'lâ-tâ*: suburb of Constantinople (q.v.).

GALATEA, n. *găl-a-tē'a* [L.]: in *myth.*, a sea nymph, daughter of Nereus and Doris.

GALATEA. See PLANETOIDS.

GALATHEA, n. *găl-a-thē'a* [from *Galatea*, daughter of Nereus and Doris]: typical genus of *Galatheidæ*, a family of decapod crustaceans, sub-order *Anomoura*, which they connect with the *Macrura*.

GALATIA, *ga-lā'shĭ-a*: in ancient times, a country of Asia Minor, so called from a body of Gauls who settled there. In B.C. 3d c. great hordes of Gauls, under Brennus, invaded Greece. Some of them took possession of Byzantium and the Propontis, passed the Hellespont on the invitation of Nicomedes, King of Bithynia, B.C. 278, subdued Troas and the n. of Phrygia, and were checked first by Attalus, King of Pergamus, in a great battle about B.C. 229, and compelled by him to settle permanently within certain limits. The state of Galatia, which had no accurately defined boundaries, was now confined between Paphlagonia, Pontus, Cappadocia, Lycaonia, Phrygia, and Bithynia. It was called also Gallogræcia, and was peopled by numbers of Phrygians, Greeks, and Paphlagonians, as well as Gauls or Celts. The form of government was at first purely aristocratic, but later the 12 tetrarchs who shared the government among them, in conjunction with the senate of 300 members, succeeded in making their dignity hereditary. At length (B.C. 30) one of them, supported by Pompey, assumed the title of king. After his death, the kingdom descended to Amyntas, but was shortly afterward conquered by the Romans, and converted into a Roman province, divided under Theodosius into *Galatia prima*, cap. Ancyra, and *Galatia secundi*, cap. Pessinus. The majority of the Gauls of Galatia retained their old Celtic language as late as the time of Jerome (4th c.), who says that they spoke the same dialect as the people about Treves: and as Jerome had himself lived there.

and was a good scholar, he may be regarded as an authority on the subject. Galatia was twice visited by the Apostle Paul.

GALATIANS, n. plu. *gă-lā'shĭ-ănz*: inhabitants of *Galătĭă*, in Asia Minor, descendants of the *Gauls*, who settled there. See GALATIA.

GALATIANS, *ga-lā'shĭ-anz*, EPISTLE TO THE: one of the books of the New Testament; a letter written by the Apostle Paul during his residence at Ephesus, probably about A.D. 56; generally reckoned the third or fourth of the Pauline epistles in the order of time. The circumstance which called it forth was the diffusion, throughout the churches in Galatia of Judaistic practices and notions, chiefly the famous rite of circumcision, regarded by Paul as the symbol of all in the Jewish system that was exclusive, external, merely *ethnical*, and therefore set aside by the brighter and universal revelation of God in Jesus Christ. Paul himself had been the first to preach Christ in this region, and as the majority of his converts were Gentiles, it naturally vexed him the more to see them lapsing into practices inconsistent with their new faith, and for which they had not the Jewish excuse that antiquity had made such customs venerable. It appears also that the Judaizing adversaries of Paul had been circulating injurious reports concerning him, hinting that he was no divinely-appointed apostle, but at best a mere messenger of the church of Jerusalem; that he had quarrelled with Peter, the great apostle of the circumcision; and that he could play 'fast and loose' on this very question of circumcision itself. In his reply to his calumniators, Paul asserts the truth of his gospel, declaring that he would pronounce a curse on the very angels from heaven if they would dare to preach another; vindicates his apostleship, and gives the true version of the story of his variance with Peter. He then proceeds to discuss the relation of Judaism to Christianity, and to show the universal provision and offer of God's grace for all nations; closes with a series of exhortations and admonitions, the first of which (v i.) is—'For freedom did Christ set us free; stand fast therefore, and be not entangled again in a yoke of bondage.' The commentaries on Galatians are very numerous; among them are those of Luther, Winer, Rückert, De-Wette, Meyer, Ellicott, and Alford.

GALAX, n. *găl'ăks* [Gr. *galaxaios*, milky, milk white; in allusion to the milk-white spikes of flowers]: genus of *Diapensiaceæ* or of *Pyrolaceæ*. *G. aphylli*, a small plant growing wild in the southern United States.

GALAXIAS, n. *ga-lăks'ĭ-as* [Gr. *galaxaios*, milky]: typical genus of *Galaxidæ*, a family of teleostean fishes, sub-order *Physostomata*: allied to the *Solmonidæ*, but destitute of an adipose fin and scales.

GALAXY, n. *găl'ăks-ĭ* [Gr. *galaxĭăs*, the milky-way—from *gala*, milk: F. *galaxie*]: the milky-way; the long

white nebulous track which seems to encompass the heavens like a girdle: hence, *fig.*, any assemblage of distinguished persons or things.—*The Galaxy*, the great luminous band which nightly stretches across the heavens from horizon to horizon, is found, when carefully traced, to form a zone, completely encircling the whole sphere almost in a great circle. At one part of its course, it opens into two branches, one faint and interrupted, the other bright and continuous, which do not reunite till after remaining distinct for about 150°. This great zone has occupied the same position in the heavens since the earliest ages. Its course is mapped out on any celestial globe, and an account of it is given in Sir John Herschel's *Outlines of Astronomy*. Its course, as traced by the naked eye following the line of its greatest brightness, conforms nearly to that of a great circle, called the Galactic Circle, inclined at an angle of about 63° to the equinoctial, and cutting that circle in 0 hours 47 minutes, and 12 hours 47 minutes right ascension. Throughout the space where, as above stated, it is divided into two branches, this great circle is intermediate to the two, lying nearer that which is the brighter and more continuous. The most casual survey of the galaxy shows that it is wanting in regularity of outline. Besides the two great branches into which it divides, it has many smaller ones which spring out from it. At one point, it diffuses itself very broadly, and opens into a fan-like expanse of interlacing branches nearly 20° in breadth. At the same point the branches terminating abruptly, a wide gap presents itself in the zone, on the opposite side of which it recommences its course with a similar assemblage of branches. At other points, its course is described by Sir John Herschel as 'irregular, patchy, and winding;' while at more than one point, in the midst of its brightest parts, broad dark spaces occur. One of these, known from early times among navigators as the 'coal sack,' is a singular pear-shaped vacancy of about 8° in length, and 5° broad, in the centre of a bright area overlying portions of the constellations of the Cross and Centaur. The 'coal sack' occupies about half the breadth of this bright space, and presents only one star visible to the naked eye, though it contains many telescopic stars. Its blackness, which attracts the most superficial observer, is thus due to the contrast with the brilliant ground by which it is surrounded. The galaxy was examined by Sir William Herschel with his powerful telescope, and found to be composed entirely of stars. For the mode in which a collection of stars can assume such appearances as are presented in the galaxy, see STARS.

GALBA. See CALOPHYLLUM.

GALBA, *găl'ba*, SERVIUS SULPICIUS, Roman Emperor: B.C. 3, Dec. 24—A.D. 69, Jan. (reigned A.D. 68—69). He was born of a respectable family: was raised to the

consulship A.D. 33; and in the administration of the province of Aquitania under Tiberius, of Germany under Caligula, of Africa under Claudius, and of Hispania Tarraconensis under Nero, he distinguished himself for bravery, strictness, and justice. His friends had urged him, on the death of Caligula, to take possession of the throne, but he continued faithful to Claudius, and therefore stood high in his favor. In 68, Julius Vindex rose with the Gallic legions against Nero, and called on Galba to assume the imperial dignity, and thus rid the earth of its oppressor. Galba, who had been informed that Nero was contriving his death, came forward against him at first as the legate of the Roman people, and it was only when he heard of Nero's death that he proceeded to Rome to take possession of the throne offered him by the Prætorians. Galba was now more than 70 years old, and it soon appeared that his character had deteriorated, as, indeed, had already been manifested in his later administrations. Indulgence to greedy favorites, ill-timed severity, above all, avarice which led him to withhold the usual donatives to the troops, made him unpopular. The legions in Upper Germany called on the Prætorians to choose another emperor; Galba thought to soothe them by adopting Piso as his coadjutor and successor; but he thus offended Otho, who, as administrator of Lusitania, had supported Galba; and looked to be rewarded. The Prætorians, who had received no donative on occasion of Piso's adoption, were easily excited to insurrection by Otho, and the emperor having gone out to quell the rebellion, was cut down by the soldiers as he crossed the forum.

GALBANUM, n. *găl'bă-nŭm* [L.]: a gum resin used in medicine in the same cases as assafœtida, but principally in chronic catarrh, and (especially by the Germans) in amenorrhœa and chronic rheumatism. It is administered usually in the form of the *compound galbanum pill*, which contains galbanum, sagapenum, assafœtida, myrrh, and soft soap. It is sometimes applied externally in plasters as a mild stimulant in indolent swellings. It is brought from the Levant, and appears in commerce either in tears or in large masses. It is soft, ductile, whitish, or, when long kept, yellowish in color, has a peculiar balsamic odor, and an acrid, bitter taste. Although it has been known from the earliest ages, and is mentioned by Moses (Exod. xxx. 34) under the name *chelbenah* (translated galbanum in the English Bible), it is still uncertain from what plant it is derived. *Galbanum officinale*, *Ferula galbanifera* (found in n. Persia), and *Opoidia galbanifera*, all of nat. ord. *Umbelliferæ*, have, on various grounds, been supposed its source. It is highly probable that Galbanum is the product of an umbelliferous plant. *Bubon Galbanum*, a plant of this order, found at the Cape of Good Hope, yields a gum resin very similar.

GALBULUS, n. *găl'bū-lŭs* [L. *galbŭlŭs;* Sp. *galbulo*, the nut of the cypress-tree]: in *bot.*, a modification of the cone, where the apex of each carpellary scale is much enlarged or fleshy, so that collectively they form a round compact fruit.

GALE, n. *gāl* [Norw. *galen*, angry: prov. Dan. *galm*, a strong blast of wind: Dan. *gal*, mad: comp. Gael. *gàill*, a storm, and Icel. *gola*, a breeze]: a loud, strong wind; a blast.—Syn. of 'gale': wind; blast; gust; breeze; storm; hurricane; tempest.

GALE, n. *gāl* or *gā'lē*, or Sweet Gale [Dut. *gagel*], (*Myrica gale*): small shrub of the same genus with the n. American Candleberry (q.v.), and very nearly allied to it—native of all the northern parts of the world, growing in bogs and in moist gravelly soils. It is, in some places, known as Scotch Myrtle, or Bog Myrtle. It has small lanceolate slightly serrated leaves sprinkled with resinous dots, and emitting an agreeable fragrance. Its berries are small, sprinkled with golden resinous dots. The northern nations formerly used this plant instead of hops. The leaves were used as a remedy for itch, and they have the power of keeping away moths. A decoction of them is efficacious against bugs. By distillation they yield a yellow essential oil. In the Highlands of Scotland, beds are often made of the twigs of Gale, there called *nodh*.

GALEATE, a. *gā'lĭ-āt*, or Ga'leated [L. *gălĕātūs*, wearing a helmet]: in *bot.*, shaped in a hollow vaulted manner like a helmet; bearing a flower resembling a helmet.

GALEMYS, n. *ga-lē'mĭs* [Gr. *galē*, a weasel; *mus*, mouse]: genus of mammals allied to the shrews, or shrew mice.

GALEN, n. *gā'lĕn* [L. *Galēnus*]: the most celebrated Greek physician of antiquity (see Galenus, Claudius). Ga'lenism, n. *-ĭzm*, medical theories, teaching, and practice of Galen. Galen'ical, a. *-ĭ-kăl*, of or pertaining to Galen or his doctrines. Ga'lenist, n. *-ĭst*, follower of Galen: see below.

GALEN, *gà'lén*, Christoph Bernhard von, Bishop of Münster, and one of the great generals of his time: 1600, Oct. 15—1678, Sep. 19; b. Bispink, Westphalia. After completing his studies in the Jesuit college of Münster, and at the universities of Cologne, Mayence, Louvain, and Bordeaux, he held several political offices, and was made Bp. of Münster, 1650, Nov. 14. The vigor of his administration immediately began to appear in restoring church-discipline, in allaying a famine which prevailed at the time, in promoting trade, and ridding the country of foreign troops. He soon, however, fell into disagreements with the inhabitants of Münster, who, applying to Holland, received 25,000 guilders to assist them against him; but with the support of 1,200

cavalry from the emperor, the bishop reduced the town into submission 1660, and kept this ascendency by severe measures. In 1664, on being appointed, with the Markgraf of Baden, director of the military affairs of the Rhenish alliance, he proceeded with most of his own troops to the seat of the war against the Turks. After his return, he entered into alliance with England against the Netherlands, but the war was soon concluded, in consequence of the treaty brought about by Louis XIV. 1666, according to which the States-general promised the restoration to the bishop of all his lands. A dispute however, afterward arose, and 1672, Galen again went to war with the Dutch in alliance with France. After some successes obtained in union with Turenne, he suffered such a heavy loss during the siege of Coevorden, by a storm which placed his camp under water, that he willingly concluded a treaty with the allies 1674, in which he promised to give up all his conquests in the Netherlands. In the following year, he changed sides, and entered into alliance with the emperor against the French. By taking part, also, with the king of Denmark and the elector of Brandenburg in the war with Sweden, he added the duchy of Bremen and other places to his possessions. In 1678, he obtained considerable pecuniary compensation for being drawn into war with East Friesland; but while the peace negotiations were going on he died. The family of Galen is one of the oldest in Westphalia, and is at present represented by Count Matthias von Galen, whose brother, Count Ferdinand, distinguished himself in the Prussian service as an able diplomatist.

GALENA, n. *gă-lē'nă*, or LEAD-GLANCE [L. *galēnă*, galena—from Gr. *galēnē*, tranquillity, galena: F. *galène*, a sort of black-lead]: common ore of lead; native sulphide of lead; essentially a sulphuret of lead, the proportions being 13·3 sulphur and 86·7 lead; but usually containing a little silver, and sometimes copper, zinc, antimony, or selenium. It is of bluish-gray color with metallic lustre, is found massive, or sometimes granular, or crystallized in cubes or octahedrons. It is very easily broken, and its fragments are cubical. It occurs in veins, beds, and imbedded masses, often accompanying other metallic ores, in primitive and secondary rocks, but most of all in what is known as transition or mountain limestone. Almost all the lead of commerce is obtained from it. It sometimes contains so much silver, that the separation of that metal is profitably carried on. The lead is extracted from it by a very simple process (see LEAD). GALENIC, a. *gă-lĕn'ĭk*, pert. to galena, or (in med.) to Galen. GALENIZING, a process of depositing upon objects a protective coating of sulphide of lead. It is the invention of Prof. Emerson Reynolds. In general terms an alkaline solution of lead is mixed with a sulpho-organic compound and heated, precipitating sulphide of lead. But instead of

the ordinary amorphous form the salt is thrown down upon bodies immersed, as a hard adherent coating that is susceptible of a fine polish. A solution of oxide of lead in sodium or potassium hydrates may be made from the acetate of lead and alkali of such strength that two litres contain the equivalent of 17 grains of acetate of lead. There should be just enough alkali present to nearly dissolve the lead-oxide. The solution is heated to 90°, is filtered and allowed to cool. A solution of 4 grains of sulphourea in 100 cubic centimetres of water is now added. If this mixture is heated a deposit of sulphide of lead is formed upon objects immersed, provided their surfaces are perfectly clean. Other methods equivalent in general to the above may be followed.

GALENA, Ill., a city and county-seat of Jo Daviess County, a port of entry on the Galena River, and on the Illinois C.; Chicago, B. & Q., and the Chicago & N. W. R.R.'s, 17 miles from Dubuque. Galena is famous as the home of Gen. U. S. Grant (q.v.) from May 1860 until the opening of the Civil War, and the old Grant homestead still remains one of the attractions of the city. There is here Grant Park, a fine statue of Gen. Grant, a United States customs house, government building, and a public library. The city has an extensive trade by rail and river, and is the centre of large lead and zinc mining interests. There are also smelting works, shoe factories, and other industries. The town, which was named after the galena ore found in the vicinity, was settled in 1827 and incorporated as a city in 1839. The mayor and council are elected every two years. The city owns its electric light plant. Pop. (1900) 4,900.

GALENA, Kan., a city in Cherokee County, on the Kansas City, Ft. S. & M., and the St. Louis & S. F. R.R.'s; 7 miles west of Joplin, Mo. It is noted principally for its remarkable growth during 10 years, 1890 to 1900. Like its namesake in Illinois, Galena is engaged largely in lead and zinc mining and smelting. The mining district, about 4 miles square, has 200 concentrating mills, and gives employment to 3,000 men. Over $5,000,000 in ore was mined in 1900. The mayor and council are elected every two years. The deputy marshal and police are appointed by the council. Galena was settled and incorporated in 1877. Pop. (1900) 10,155. (1910) 6,096.

GALENICAL, *ga-len'ik-al*—GALENIST, *gā'lĕn-ĭst:* two words referring to the controversies of the period of the revival of letters, when the authority of Galen was strongly asserted against all innovations, and particularly against the introduction of chemical, or rather *alchemical* ideas and methods of treatment into medicine. The Galenists adhered to the ancient formulas, in which drugs were prescribed, either in substance or in

the form of tinctures and extracts, etc.; while the chemists professed to extract from them the essences, or quintessences (*quinta essentia*, the *fifth* essence, supposed to be particularly pure, as requiring five processes to extract it), i.e., substances in small bulk, presumed to contain the whole virtues of the original drugs in a state of extreme concentration, or purified from all gross and pernicious, or superfluous matter. On both sides of this controversy there was much blind error and rash dogmatism, which on the side of the chemists, as in Paracelsus, took the form of quackery and mysticism; while the Galenists, on the other hand, were supporters of tradition and all its encumbrances, and often the envenomed partisans of old misconceptions. But the original idea of those who afterward became identified with the sect of the Galenists, was rather to free the ancient medicine from the irrational dogmas and methods with which it had been overlaid by the Arabians and the monks, than to insist blind assent to mere antiquity, or to Galen's authority in particular. Now that chemistry has really given us new methods of preparing drugs, which supersede many used from time immemorial, it is still customary with some to call preparations by the old methods *Galenical*, as contrasted with the crystalline alkaloids, or the perfectly pure acids and bases, which contain the virtues of the most valuable vegetable medicines. See GALENUS, CLAUDIUS; PARACELSUS; ALCHEMY; and titles of articles of the materia medica.

GALENUS, *ga-lē'nŭs*, CLAUDIUS, commonly called GALEN, *gā'lĕn:* 130—abt. 201; b. Pergamus in Mysia: very celebrated physician. In his 17th year, his father, Nicon, who had destined him to be a philosopher, in consequence of a dream chose for him the profession of medicine, which he studied at Pergamus, Smyrna, Corinth, and Alexandria. He returned to his native city in his 29th year, and was at once appointed physician to the school of gladiators. In his 34th year he went to Rome, where he stayed about four years, and gained such reputation that he was offered, but declined, the post of physician to the emperor. He returned to his native country in his 38th year, and had scarcely resumed his ordinary course of life, when he received a summons from emperors M. Aurelius and L. Verus to attend them in the n.e. frontier of Italy, whither they had gone to make preparations for a war with the northern tribes. He joined the camp toward the end of 169; but a pestilence breaking out, the emperors and their court set off for Rome, whither Galenus accompanied or followed them. On the return of M. Aurelius to the seat of war, Galenus obtained permission to be left at Rome, alleging that such was the will of Æsculapius, as revealed to him in a dream. How long Galenus stayed at Rome on this second occasion is not known, but we ascertain from his works that he attended M. Aurelius

and his two sons, Commodus and Sextus, and that at about the end of the 2d c. he was employed to compound a celebrated medicine called Theriaca for Emperor Severus. If the statement of one of his Arabic biographers be correct, who expressly says that Galenus was only twice at Rome, we must infer that the greater part of his middle and more advanced life was spent in that city. The place and date of his death are not known with certainty, but it is believed that he died in Sicily about 201.

The works extant under the name of Galenus consist, according to Choulant, in his *Handbuch der Bücherkunde für die aeltere Medicin*, of 83 treatises acknowledged genuine; 19 whose genuineness has been questioned; 45 undoubtedly spurious; 19 fragments; and 15 commentaries on different works of Hippocrates. Besides these, he wrote a great number of works whose titles only are preserved, and altogether it is believed that the number of his distinct treatises cannot have been less than 500.

We may divide his works into (1) those on anatomy and physiology; (2) those on dietetics and hygiene; (3) those on pathology; (4) those on diagnosis and semeiology; (5) those on pharmacy and materia medica; (6) those on therapeutics, including surgery; (7) his commentaries on Hippocrates; and (8) his philosophical and miscellaneous works. We have most of these works in Greek, in which they were originally written; some are preserved only in Latin translations, and a few only in Arabic. His most important anatomical and physiological works are—*De Anatomicis Administrationibus*, and *De Usu Partium Corporis Humani*. Of the latter, Dr. Greenhill (Smith's *Dictionary of Greek and Roman Biography*) remarks that 'it is no less admirable for the deep religious feeling with which it is written, than for the scientific knowledge and acuteness displayed in it.' For a good general account of Galenus' anatomical and physiological knowledge, we may refer to a memoir published by the late Prof. Kidd of Oxford in Vol. VI. of *The Transactions of the Provincial Medical and Surgical Association*, entitled 'A Cursory Analysis of the Works of Galen, so far as they relate to Anatomy and Physiology': Daremberg's *Exposition des Connaissances de Galien sur l'Anatomie, la Physiologie, et la Pathologie du Système Nerveux* (Paris 1841) also may be consulted with advantage. His anatomical and physiological writings are by far the most valuable. They show his familiarity with practical anatomy; but whether from dissections of human bodies or of those of the lower animals, is uncertain. The latter is probable —(1) because he frequently recommends the dissection of apes, bears, goats, etc.; and (2) because he mentions, as something extraordinary, that those physicians who attended Emperor M. Aurelius in his wars against the Germans had an opportunity of dissecting

the bodies of the barbarians. Much curious information regarding Galenus' views on dietetics and hygiène will be found in Adam's *Commentary on the First Book of Paulus Ægineta*. His pathology was very speculative and imperfect. In his diagnosis and prognosis, he laid great stress on the pulse, on which subject he may be considered as the first and greatest authority, for all subsequent writers adopted his system without alteration. He likewise placed great confidence in the doctrine of critical days, which he believed to be influenced by the moon. In materia medica, his authority was not so high as that of Dioscorides. Numerous ingredients, many of which were probably inert, enter into most of his prescriptions. He seems to place a more implicit faith in amulets than in medicine, and he is supposed by Cullen to be the author of the anodyne necklace, long famous in England. His system of therapeutics is based on two fundamental principles—(1) that disease is something contrary to nature, and is to be overcome by that which is contrary to the disease itself; and (2) that nature is to be preserved by that which has relation to nature. Hence arise two general indications of treatment—the one taken from the affection contrary to nature, which affection requires to be overcome; the other from the strength and natural constitution of the body, which requires to be preserved.

Before Galenus' time, the medical profession was divided into several sects always disputing with one another; e.g., the Dogmatici, Empirici, Eclectici, Pneumatici, and Episynthetici. After Galenus, all these sects seem to have merged in his followers. The subsequent Greek and Roman medical writers were mere compilers from his writings; and as soon as his works were translated (9th c.) into Arabic, they were at once adopted throughout the East, to the exclusion of all others. In short, Galenus reigned paramount throughout the civilized world till within the last 300 years. The records of the London College of Physicians afford a striking illustration of this fact as concerns England: in 1550, Dr. Geynes 'was cited before the college for impugning the infallibility of Galen. On his acknowledgment of his error and humble recantation, signed with his own hand, he was received into the college.'

The Greek text has been published four times. The first ed. was the Aldine, 1525, in 5 folio vols.; the latest and most accessible ed. is that of C. G. Kühn, in 20 octavo vols. (1821—33). A good critical edition is still lacking.

GALEODES, n. *găl-ē-ō'dēz* [Gr. *galē*, a weasel; *eidos*, form]: typical genus of *Galeodidæ*, a family of arachinda (spiders) order *Adelarthrosomata*.

GALEOPITHICUS. See Flying Lemur.

GALERITES, n. plu. *găl'ĕr-ītz* [L. *gălĕă*, a helmet]: genus of fossil sea-urchins, peculiar to and abundant in

the Chalk measures. The generic name, as well as that popularly given to them in the districts where they abound, viz., 'Sugar-loaves,' is descriptive of the elongated and more or less conical shape (helmet shape) of their shell. The body in breadth is nearly circular or polygonal. The under surface is entirely flat, and has the mouth placed in the centre, with the vent near the margin. There are five avenues of pores reaching from the mouth to the summit. These fossils are often found silicified. The species figured is one of the most abundant; it has received its specific name from its resemblance to the white caps worn by the priests of Jupiter.

GALERIUS, *ga-lē'rĭ-ŭs*, Valerius Maximianus, Roman Emperor: d. 311 (reigned 305—306); b. of humble parentage, near Sardica, in Dacia. Entering the imperial army, he rose from one grade of military rank to another, until Emperor Diocletian conferred on him, with Constantius Chlorus, the title of Cæsar (292), and gave him his daughter in marriage. On the abdication of Diocletian (305), he and Constantius became *Augusti*, or joint-rulers of the Roman empire. On the death of Constantius at York (306), the troops in Britain and Gaul immediately declared their allegiance to his son, Constantine (afterward Constantine the Great), much to the chagrin of Galerius, who expected the entire sovereignty of Rome to fall into his hands. Galerius was a brave soldier and a skilful commander, but appears to have no other claims to the respect of posterity. He hated the Christians 'with a perfect hatred;' and it is believed that it was he who forced Diocletian to issue his famous edict against them which caused the *last* of the imperial persecutions. His mother, an ignorant pagan fanatic, is said to have exercised much influence over him: but it is highly probable that his treatment of the adherents to the Christian faith was determined also by a politic opposition to Constantius and his son who tolerated, and even respected the new opinions and practices.

GALERUCA, n. *găl-ĕr-ō'ka* [L. *galerum*, a kind of conical head covering]: typical genus of *Galerucidæ*, family of herbivorous, tetramerous beetles, sub-tribe *Cyclica*.

GALES, *gālz*, Joseph: 1760-1841, Aug. 24; b. England: journalist. He was a printer, bookseller, and publisher in Sheffield: removed to the United States 1793, settled in Philadelphia, and became editor of the *Independent Gazetteer*. While so employed he was the first to make shorthand reports of congressional debates. In 1779 he sold his paper and removed to Raleigh, N. C., where he founded, and till within a few years of his death edited the *Register*.

GALES, Joseph: son of Joseph G.: 1786, Apr. 10—1860, July 21; b. Eckington, England: journalist. He was educated at the Univ. of N. C., learned the prin-

ter's trade in Philadelphia; became asst. editor of the *National Intelligencer* (the old *Independent Gazetteer*, removed to Washington, and name changed 1800) in 1807, and sole proprietor 1810. In 1812 he associated his brother-in-law, William W. Seaton, with him, and started a daily edition of the *Intelligencer* (1813, Jan.), which was continued till after the death of both partners, 1869.

GALESBURG, *gālz'berg*: city, cap. of Knox co., Ill.; at the junction of four divisions of the Chicago Burlington and Quincy railroad; 40 m. e. of Burlington, 53 m. w.n.w. of Peoria, 99 m. n.e. of Quincy, 160 m. w.s.w. of Chicago. It contains the extensive railroad shops of the Burlington system, employing a great number of mechanics; has large stockyards, boiler and engine works, farm-machinery works, carriage and wagon factories, brick-making plants, and owns and operates its waterworks and electric lighting and power plants. It has a free public library, high and graded schools, St. Joseph Academy, Ryder Divinity School, and is the seat of Knox College (Congl.) founded 1837, where the famous Lincoln-Douglas debate was held 1859, and of Lombard Univ. (Universalist) founded 1857; the two last institutions are co-educational. Pop. (1900) 18,607; (1910) 22,089.

GALE'S COMPOUND: mixture of gunpowder with powdered glass, by which the gunpowder is rendered non-explosive: named from the inventor.

GALESVILLE: village, Trempealeau co., Wis.; on Chicago and Northwestern railroad; 20 m. n. of La Crosse; named for George Gale, who here endowed a university under Presbyterian auspices. Galesville has manufactories of flour, butter, and bee-keeping supplies. Pop. (1900) 862.

GALEUS, n. *găl'ĕ-ŭs* [L. *galeos*, a kind of shark or dogfish]: typical genus of the family *Galeidœ*, a family of squalina (sharks).

GALI, Francisco, *frän-thēs'kō gä'lē*, Spanish navigator: b. Seville 1539; d. Mexico City 1591. He sailed from Acapulco in 1585 with two vessels, under commission of Pedro Moya de Contreras, provisional viceroy of New Spain, to look for a harbor on the coast of California where ships returning from the East Indies might be restocked with provisions. He visited the Philippines, Macao, the Lin-Kins Japan, and other islands, and on his return (1584) discovered what is now the Bay of San Francisco. The report of the voyage sent by him to the viceroy of the Indies was published by Linschot in a Dutch rendering in *Track Charts of the Indies* (1596), and an English translation appears in Hakluyt's *Voyages*. In the National Library, Mexico, are fragments of what is believed to have been a more extended narrative by Gali. He was a skilful navigator and acute observer.

GALIANI, *gâ-lē-â'nē*, FERDINANDO: 1728—87; b. in Chieti, a prov. of the Abruzzi: Italian savant. He showed an early and extraordinary aptitude for learning. Philosophy, history, archeology, and especially political economy, were his favorite studies; but he attracted notice first by a clever squib on the death of the public executioner. This consisted of a collection of essays eulogistic of the deceased, in which the style of the president and leading members of the Neapolitan Acad. was admirably imitated. His next publication, *Della Moneta*, written when he was scarcely 20 years old, evinced great learning and powers of reflection, and a valuable contribution to the science of political economy. Its leading principle is, that coin is a merchandise, and that its value and interest ought to be left free like other goods. In 1751, he visited the chief cities of Italy and was everywhere honorably received. On his return to Naples he collected a rich assorment of the stones and volcanic matter of Vesuvius, which he presented to the pope, accompanied by a learned thesis. On one of the stone specimens, he engraved the following suggestive inscription, '*Beatissime pater, fac ut lapides isti panes fiant;* and received as answer the rich prebend of Amalfi, for which he had previously qualified himself by entering into holy orders. In 1759, he became sec. to the Neapolitan embassy at Paris, where his wit, vivacity, and learning made him a universal favorite. In 1767, he visited England, whose social and political institutions he studied deeply. On his return to Paris, he wrote another treatise on political economy, entitled *Diagloghi sul Commercio del Grano* (Dialogues upon the Trade in Corn), in which he argues against both the extreme protectionists, and the pure free-traders. Recalled to Naples, he was successively appointed to various posts of trust and importance. He died at Naples, leaving rare collections of musical MSS., ancient coins, sculptures, medals, precious stones, cameos, etc.

GALICIA, *ga-lĭsh'ĭ-â*, Sp. *gâ-lē'thē-â*: crown-land belonging to the Austrian monarchy, including the former kingdoms of Galicia and Lodomeria, the duchies of Auschwitz and Zator, and grand duchy of Cracow; 30,307 sq. m., pop. (1900) 7,315,816. With the exception of 114,000 Germans, and nearly 500,000 Jews, the inhabitants are of the Slavonic race, western Galicia being occupied mainly by Poles, the east by Ruthenians. In faith the people of Galicia are mostly Rom. Catholics. The country is a high terrace, at the n. base of the Carpathians. The n. portion is an extensive plain, broken only by low ranges of hills. There are many large rivers—those in the w. being feeders of the Vistula, those in the e. of the Danube and Dneister. The climate of Galicia is colder than that of any other portion of the Austrian empire; the soil, with the exception of some sandy and marshy districts, is fertile, and produces grain, exported in considerable quantities. Flax, hemp,

tobacco, hops, etc., are cultivated. Horses, cattle, and sheep are raised. Wolves and bears are still found in the mountainous districts. Salt is the most important mineral. Industry has lately made marked progress. Commerce is on the increase. The roads are good; the railway from Cracow to Lemberg has greatly developed the resources of the country. For administrative purposes, Galicia has been divided into Lemberg, Cracow, and Stanislawow. Galicia takes its name from the old fortress and town of Halicz (q.v.) on the Dneister. The original Slavonic inhabitants, the Ruthenes, were, in the 9th c., conquered by the Russians of Kiew. The w. portion of the country had already become dependent on Poland, and afterward on Hungary. In 1382 it was restored to Poland, and so continued till the partition of Poland 1772, when Galicia became one of the crown-lands of Austria. In 1846, Cracow, with the territory belonging to it, was, by a treaty of the three powers (Austria, Russia, and Prussia), given up to the emperor of Austria, and by him annexed to the crown-land of Galicia.

GALIC'IA: formerly a province in the n.w. of Spain, 11,344 sq. m.; divided, since 1833, into the minor provinces of Coruña, Lugo, Orense and Pontevedra. The country is mountainous, being covered by several offsets of the Asturian chain, rising in their highest peaks about 6,000 ft. Capes Ortegal and Finisterre project into the Atlantic. The numerous rivers form *Rias*, or small estuaries at their mouths affording secure havens and roads. The principal river is the Minho, which, with its feeders, the Sil and the Avia, is navigable as it approaches the sea. Galicia is one of the most fruitful portions of Europe, and has a mild nourishing climate. Rich meadows and dense forests are numerous, but the soil is suited to the cultivation rather of garden produce than corn. The inhabitants, called Gallegos, are a robust, vigorous and industrious race. They visit various parts of the country, and are employed in Madrid as water-carriers, porters, etc. Fishing and navigation are the occupations most largely followed. Linen manufactures have been recently established. The principal towns are St. Jago di Compostella, and the two strongly fortified seaports of Coruña and Ferrol. Pop. of the four provinces (1900) 1,980,515.

GALICZ. See Halicz: Galicia (Austria).

GALIGNANI, *gâ-lēn-yâ'nē*, John Anthony: and William: Parisian publishers: John Anthony, 1796, Oct. 13—1873, Dec.; William, 1798, Mar. 10—1882, Dec.; both b. in London. Their father, an Italian, founded an English library at Paris 1800, and there published an English *Monthly Repertory*, and began 1814 the famous newspaper *Galignani's Messenger*. The *Messenger* was much improved by his sons, who made it an important medium for advocating cordiality between England and

France. The brothers, distinguished by works of philanthropy, received honors from both governments, and had wide popularity and respect.

GALILEE, n. *găl'ĭ-lē*: a province of Palestine (see below); a porch or chapel at the entrance to some anc. churches, beyond which women were not permitted to pass. In abbeys the monks came to the galilees to see their female relatives. Sometimes a portion of the nave was marked off by a step, or as at Durham, England, by a line of blue marble, as the boundary for women. There are fine specimens of galilees at Lincoln and Ely. GAL'ILE'AN, n. *-lē'ăn*, an inhabitant of Galilee.

GALILEE, *găl'ĭ-lē* [Heb. *Galil*, a 'circle' or 'circuit']: name applied latterly to one of the four Roman divisions of Palestine; originally referred only to a district of the tribe of Naphtali. Here were the 20 towns which Solomon gave to Hiram, King of Tyre, for his assistance in building the temple. Phœnician colonies, in consequence, appear to have established themselves here, for at a latter period we find Isaiah (ix. 1) speaking of the district as 'Galilee' of the nations.' These 'nations,' or Gentiles (heathen) finally spread themselves over the surrounding country, until, in the time of our Lord, the name 'Galilee' embraced all northern Palestine from the Mediterranean to the Jordan. The district was divided into Upper and Lower Galilee, the former hilly but well wooded, the latter level and very fertile. As early as the time of the Maccabees (I. Macc. v. 20—23), the number of Jews in Galilee was very small; Strabo, contemporary of Christ, states that in his day it was inhabited mainly by Syrians, Phœnicians, and Arabs, to whom Josephus adds Greeks. The principal towns at the dawn of Christianity were Tiberias, Tarichæa, and Sepphoris; those that figure in the gospels are Cana, Capernaum, Nazareth, and Nain. The Jewish inhabitants of Galilee spoke a broader and coarser dialect than their southern brethren of Judæa, and were held in low estimation by the latter, partly on account of their less strict sentiments in regard to religion, which were due probably to their intercourse with heathen neighbors. Every one of the disciples was a Galilean either by birth or residence, and consequently may not have been a *Jew* at all in the strict sense of the term; i.e., in being able to boast of having 'Abraham for his father.' The first three gospels chiefly contain records of the Savior's ministrations in this province. After the destruction of Jerusalem, the despised Galilee, as if retributively, became the refuge of the proud doctors of Jewish law, and the city of Tiberias the seat of rabbinical learning. The ruins of many fine synagogues are extant in the old towns and villages of this region. At present, Galilee belongs to the pashalic of Damascus, in the Turkish province of Syria or Soristan, and, as of yore, is remarkable for beauty and fertility. It still has a considerable number of Jewish inhabitants. For Sea of Galilee, see GENNESARET.

GALILEI.

GALILEI, *gâ-le-lā'ē*, GALILEO: bringer of the new era in experimental science: 1564, Feb. 15—1642, Jan. 8; b. Pisa; of a Florentine family more ancient than opulent. By desire of his father, Galilei directed his early studies exclusively to medicine, and to the prevailing Aristotelian philosophy, whose dogmas he soon ventured to disbelieve and despise. At the age of 18, he made one of his most important discoveries. Happening to observe in the Cathedral of Pisa the oscillation of a lamp casually set in motion, Galilei was struck with the apparent measured regularity of its vibrations; and having tested the correctness of this observation by comparing the beat of his own pulse with the action of the pendulum, he concluded that by means of this equality of oscillation a simple pendulum (q.v.) might be made valuable for the exact measurement of time. This discovery he successfully applied in constructing a clock for astronomical purposes. Galilei's irrepressible bias toward mechanical constructions and experimental science received new impulse from intercourse with his father's friend Ostilio Riccio, prof. of mathematics, who, in compliance with the youth's entreaties, initiated him into the principles of mathematics. Such was Galilei's absorption and delight in his new studies that his father at length sanctioned his abandonment of the art of medicine, for his chosen sciences. The first fruit of his geometrical investigations was the invention of a hydrostatic balance, by which the specific gravity of solid bodies might be ascertained with accuracy. In 1589, the fame of Galilei's extraordinary learning having reached the Grand Duke of Tuscany, this enlightened prince appointed him prof. of mathematics in the Univ. of Pisa, where he covertly inculcated many of those great innovations in physical science which have since given lustre to his name. About this period, he turned his attention to the very imperfectly known-laws of bodies in motion; and in opposition to all received systems, he propounded the novel theorem that all falling bodies, great or small, descend with equal velocity. This soon led him to the discovery of 'the *three* laws of motion,' and the law regulating the motion of falling bodies, which is expressed by the formula $S=\frac{1}{2}ft^2$. This theory of falling bodies was proved correct by several experiments from the summit of the leaning tower of Pisa, greatly to the chagrin of the Aristotelians, whose enmity to Galilei now grew more decided. In consequence, he deemed it prudent to relinquish his chair at Pisa, and retired to Padua, where he accepted the offer of the Venetian senate to lecture on mathematics in the univ. for six years. It is also said, however, that Galilei lost his chair at Pisa from having ridiculed the mechanical pretensions of John de' Medici, son of Cosmo I. Galilei's engagement at Padua was eventually prolonged to 18 years; but so urgent was his desire to return to his birthplace that he sought

a restoration to his former post at Pisa, and was gratified by an assent eagerly accorded by Cosmo de' Medici, with exemption from any but a voluntary exercise of the duties of the professorship. During his sojourn at Padua, his course of lectures had extraordinary popularity; crowds of pupils flocked to hear him from all parts of Europe; and he was the first to adopt the Italian idiom to philosophical instruction. Among the various and noble discoveries with which he enriched science, were a species of thermometer, a proportional compass or sector, and, most important of all, the construction of the refracting telescope for astronomical investigation. In 1609, he offered his first complete telescope to the Doge of Venice, Leonardi Deodati, by whom it was tested from the tower of St. Mark with equal surprise and delight. In the same year, he constructed a microscope; and then this indefatigable interpreter of the mysteries of nature commenced his astronomical researches by means of his own telescope. He speedily concluded that the moon, instead of being a self-luminous and perfectly smooth sphere, owed her illumination to reflection, and presented an unequal surface, deeply furrowed by valleys and mountains of great extent. The Milky Way he pronounced a track of countless separate stars; and these discoveries were crowned by a still more important series of observations, which led to the discovery of the four satellites of Jupiter on the night of 1610, Jan. 7 (though it was not till Jan. 13 that he came to the conclusion that they were satellites, and not fixed stars), which he named the Medicean stars, in honor of his constant protectors in that family. He also was the first to note movable spots on the disk of the sun, from which he inferred the rotation of that orb. Encircled by the lustre of these sublime discoveries, he departed from Padua, and returned to Tuscany 1610, where renewed quarrels with the Aristotelians disquieted and embittered his existence. In 1611 he visited Rome, and was received with great distinction, being enrolled a member of the Lincei Academy; but four years later, on repeating the visit, his reception was widely different, as by that time in his work on the solar spots he had openly advocated the Copernican system, and was in consequence denounced as a propounder of heretical views. He repaired again to Rome, to demand an experimental inquiry into the soundness of his views; but the grand duke apprehending inquisitorial dangers for his favorite, summoned him back to Tuscany; at the same time the pope, through the famous Cardinal Bellarmine (a sincere friend of Galilei), commanded him to abstain from all future advocacy of his heretical doctrines. Some time afterward he wrote his most famous work in the form of a dialogue between three fictitious interlocutors, one in favor of the Copernican system, the second an advocate of the Ptolemaic, and the third

a rabid supporter of the Aristotelian school. Of course, the whole weight of the *proof* falls into the Copernican scale; and this composition has a wonderful classic beauty and a compact chain of argument. In 1630, Galilei contrived to obtain the papal imprimatur, which was subsequently revoked; but having got a similar authorization at Florence, he published, 1632, this exponent of his opinions under the title of *Un Dialogo intorno i due Massimi Sistemi del Mondo.* Hardly had the work been issued, when it was given over to the jurisdiction of the Inquisition. Pope Urban, previously Cardinal Barberini, until now a friend and eulogist of Galilei, was led to believe that Galilei had satirized him in this work under the title of *Simplicio*, as one who is careless about scientific truth, and who timidly adheres to the saws of antiquity. He resolved to punish the audacious philosopher. In spite of his 70 years and heavy infirmities, Galilei was summoned before the Inquisition to answer for his heresies. After a wearisome trial and incarceration, his judges condemned Galilei to abjure by oath on his knees the sublime truths of his scientific creed. This in his age and infirmity he was weak enough to do. The question whether he was put to the torture has been copiously discussed of late (see *Nature*, XVII.), and whether the records of his trial have not been tampered with. His famous whisper, *E pur si muove* ('But nevertheless it does move'), is also by some regarded as a fiction. Galilei was sentenced to an indefinite imprisonment in the Inquisition, which was soon commuted by Pope Urban, at the request of Ferdinand the Grand, Duke of Tuscany, into permission to reside at Siena, and finally at Florence, should the prisoner's health require the change. In his retreat at Arcetri, he continued with unflagging ardor his learned researches, even when hearing grew enfeebled and sight was extinguished. He died at the age of 78, and was interred by ducal orders in the cathedral of Santa Croce, where a majestic monument symbolizes his great achievements. His disposition was truly genial; he enjoyed with keenness the social wit and banter of his chosen friends, and the generous pleasures of the banquet; and the readiness with which he offered or accepted atonement, modified a somewhat irascible disposition. The great deficiencies in his character were a want of tact to keep out of difficulties and a want of moral courage to defend himself when involved in them. His biting satirical turn, more than his discoveries in science, was the cause of his misfortunes. The dignitaries of the church who persecuted Galilei warned him beforehand in the friendliest way to be 'more prudent.' Their conduct in persecuting opinion, rather, in Galilei's case, *demonstrated fact*, is of course utterly inexcusable; but gives no reason for the opposite extreme of declaring Galilei a martyr. It is right to add, that the congregation of the Inquisi-

tion by which Galilei was condemned, is not believed by Rom. Catholics to speak with the plenary authority of their Church, nor are its decisions regarded as infallible even by extreme ultramontanes. Galilei was of small stature, but of robust and healthy frame; his countenance was attractive, and his conversation cheerful. He loved art, and cultivated especially music and poetry. Ariosto he knew almost by heart, and appreciated keenly the beauties of this great classic. Tasso, on the other hand, he unduly depreciated, and inflicted much pain on the sensitive spirit of the poet by his severe criticism entitled *Considerazioni al Tasso.* His own style is nervous, flowing, and elegant. The best edition of Galilei's collected works is by Alberi (16 vols. Flor. 1842-56). See Viviani's life of Galilei; Brewster's sketch.; M. Chasles's *Galileo Galilei* (1862); Pieralisi's *Urbano VIII. e G.* (1875); Gebler's *G. und die Römische Curie* (1876); Berti's *Copernico e il vicende del Sistema Copernicano* and *Il Processo Originale di G.* (Rome 1876); the *Quarterly Review* for 1878, Apr.; and Riccardi's *Bibliographia Galileiana* (1873). Galilei's most important contributions to physical science are recapitulated briefly as follows: (1) The relation between space and time in the case of falling bodies, also the 'three laws of motion;' (2) The path of projectiles is a parabola; (3) The isochronism of the pendulum; (4) That air has weight, also partial discovery that suction is owing to the pressure of the atmosphere; (5) The re-invention of Aristotle's theory respecting sound; (6) The invention of the telescope; (7) The discovery of the satellites of Jupiter, phases of Venus, and spots on the sun. See Pendulum, Falling Bodies, Projectiles, etc.

GALINGALE, *găl'ĭn-gāl:* name often applied to the tubers of *Cyperus longus,* and sometimes to the whole plant. See Cyperus.

GAL'ION, Ohio, a city in Crawford County on the Erie and the Cleveland, C., C. & St. L. R.R.'s, 81 m. s.w. of Cleveland. Galion is an important railroad town, being a connecting point and division terminal. There are railroad shops and round-houses here, brick and tile works, carriage and wagon factories, wheel and gear works, iron foundries, and lumber-mills. The town was originally laid out in 1831, by settlers from western Pennsylvania, and was chartered as a city in 1878. The city owns and operates its electric light and water plants. The government is composed of a mayor, who holds office for two years, and a common council, elected by popular vote. Pop. (1900) 7,482; (1910) 7,214.

GALIOT, or Galliot. n. *găl'ĭ-ŏt* [F. *galiote*—dim. of *galère*: OF. *galée*]: Dutch vessel, with main and mizzen mast, and a large gaff-main-sail. Galiots—strong-built, flat-bottomed ships of 400-500 tons—formerly used as bomb-vessels.

GALIPE'A. See Angostura Bark.

GALIPOT, n. *găl'ĭ-pŏt* [F. *galipot*]: a white resinous juice found flowing from fir or pine trees.

GA'LIUM. See BEDSTRAW.

GALIZIN, or GALLITZIN. See GOLITZIN.

GALL, n. *gawl* [Dut. *gal;* Icel. *gall*, gall; AS. *gealla*, gall; *gealew*, yellow; Ger. *galle*, gall; *gelb*, yellow]: in an animal, a bitter yellowish-green fluid contained in the gall-bladder; bile (see LIVER); anything extremely bitter; anger; rancor; bitterness of mind; a neutral salt skimmed off the surface of melted crown-glass. GALL-BLADDER, a small sack, pear-shaped, which receives the bile from the liver (see LIVER). GALL-STONE, a concretion found in the gall-bladder (see CALCULUS).

GALL, n. *gawl*, or GALL-NUT [It. *galla*, a bubble, an oak-gall: F. *galle*, a gall-nut—from L. *galla*, the oak-apple]: a hard round excrescence growing round the eggs of an insect deposited in the tender shoots of the oak-tree, ets. GALL-FLY (see below). GAL'LIC, a. *-lĭk*, pertaining to or obtained from galls, as *gallic acid*. GALLATE, n. *găl'lāt*, compound of gallic acid with a base.

GALL, v. *gawl* [OF. *galler*, to fret, to itch; *galle*, a fretting or itching: It. *galla*, scab; Icel. *galli*, a fault or imperfection: comp. Gael, *galar*, disease]: to hurt or break the skin by rubbing; to break any surface by rubbing; to tease; to vex much; to chagrin; to wound the feelings: N. a wound in the skin by rubbing. GAL'LING, imp.: ADJ. adapted to fret or vex: harassing, as a galling fire; N. a fretting or wearing of the skin by friction. GALLED, pp. *gawld*.—SYN. of 'gall, v.': to chafe; rub; wear away; excoriate; vex; fret; harass; annoy.

GALL, n. *găl* [Gael. *caile*, a vulgar girl; *galad*, a young girl]: in *slang*, a corruption of OE. *callet*, a quean; a girl; a sweetheart. See CALLET.

GALL, or GALL-NUT: hard excrescence growing around the eggs deposited by an insect in the tender shoots of a tree. These growths are of various shapes, but the oak-galls chiefly used in commerce are nearly globular, with slightly pointed excrescences sparingly placed on their surface. They are remarkable for containing a peculiar acid called *gallic*, which is only an altered condition of tannic acid, and their value is due entirely to the great accumulation of this principle in the diseased condition of the vegetable tissue which constitutes the gall. This gallic acid (q.v.) is easily separated in the form of beautiful white acicular crystals, which, after a little exposure, becomes pale yellow. It is in extensive demand as a fixing agent for photographic pictures. Until this demand was created, only three or four kinds of galls were known in commerce, and these were almost wholly employed in dyeing, the common Turkish galls being also in frequent medicinal use; now, several others are imported in considerable quantities. The following are the chief: 1. The Turkish galls, of two kinds, *blue* and

white; by far the most common in use. They are derived chiefly from Constantinople and Smyrna, to the average annual amount of 300 tons—an enormous quantity when we consider how they are produced, and the industry necessary to collect them. They are each about the size of a round nutmeg, and the blue, which are the best, are entire, being gathered before the escape of the insect. The so-called white galls are of a yellowish-brown color, each perforated with a small round hole, about the sixteenth of an inch in diameter, whence the insect has escaped. These galls are produced by a species of Cynips (*C. quercus-galli*) on the dyer's oak (*Quercus infectoria*) native of Asia Minor from the Bosphorus to Syria, and from the Grecian Archipelago to the frontiers of Persia. Of this kind of gall, several varieties are known in commerce, as the Aleppo; the Syrian or Mosul, which are the best known; the Tripoli Taraplus or Tarablous, obtained from Constantinople, and the Smyrna galls. 2. The small Aleppo or coriander gall, generally about the size of a large pea. They are always perforated or empty galls, and are of brownish-yellow color, round, and with small blunt spines. The export is probably not large. 3. The large Bassorah, Bussorah, or Mecca galls, the largest known in commerce; as large as an Orleans plum; smooth, except a ring of curious slightly raised excrescences sometimes found round the middle, dividing the gall into two hemispheres. They are reddish brown, and are said, when on the trees (*Quercus infectoria*), to be colored as brightly as apples. These are the apples of Sodom, or the Dead Sea apples, bright to the eye, but filled with a gritty astringent matter, likened to ashes; it is formed on the *Quercus infectoria* by *Cynips insana*. These are not extensively exported. 4. The acorn gall, Knoppern, Knobben, Hungarian, or German gall; found chiefly in Hungary and much used by German dyers. It is a curious irregular-shaped brown gall, deeply furrowed, and covered with angular excrescences. It is produced on the common oak (*Quercus pedunculata*) by *Cynips Quercûs calycis*. 5. The small E. Indian galls called Mahee, and Sumrut-ool-toorfa, obtained from the Indian Tamarisk (*Tamarix Indica*). They are very small, about the size and color of tares, and are so rough and irregular in form, that they resemble little lumps of dried garden soil. 6. The Chinese galls, or Woo-pei-tsze. These very curious vegetable excrescences were regarded only as curiosities some years since, but are now regular articles of commerce. They are of very irregular shape, branching out sometimes like fingers. Their length seldom exceeds two inches; they are rarely more than a quarter of an inch in diameter at the base, where they spring from the tree, but they spread out as much sometimes as an inch and a half or two inches. When broken, they are found to consist of a thin shell, not thicker than a walnut shell, of dark-yellowish or reddish-brown color internally, and semi-trans-

parent; but externally they are covered with a very fine down, and consequently resemble the young horns of a stag when just budding. They are produced on the *Rhus semi-alata* (see SUMACH), by an insect not yet known to science. Since the Japanese ports have been opened to commerce there has been considerable export of these curious galls. They are rather more branched, the branches or lobes being smaller than in the Chinese variety, but in other respects they are the same.

A very great many galls are known in most parts of the world, and the oaks yield numerous species, but those above enumerated are the galls of commerce: few others have ever been found to pay the expense of collecting. Galls are extensively used in dyeing, chiefly for the production of black colors, with logwood and the salts of iron, either for dyeing in the piece, or printing patterns; in each case the material is first submitted to the action of a solution of the galls, afterward to another of the dye-wood and iron salt. Galls are also an important constituent in writing-ink (see INK), and are used in tanning the finer fancy leathers.

GALL, *gawl*, Ger. *gâl*, FRANZ JOSEPH: founder of phrenology: 1758, Mar. 9—1828, Aug. 22; b. Tiefenbrunn, near Pforzheim, on the borders of Baden and Würtemberg. He studied medicine at Vienna, and settling there became known as a practical physician, and by the publication of his *Philosophisch-Medicinische Untersuchungen über Natur und Kunst im gesunden und kranken Zustande des Menschen* (Vienna, 1791). But he acquired a much more extended reputation by his lectures on the structure and functions of the brain, beginning 1796: see PHRENOLOGY. His views were so subversive of received doctrines on the subject of mind, that opposition was excited, and the lectures were prohibited 1802 by the Austrian government. With his pupil Dr. Spurzheim (q.v.), who became his associate in 1804, Gall quitted Vienna 1805, and during his travels through Germany, Holland, Sweden, and Switzerland, expounded his views in many of the universities and principal cities, where he found many adherents as well as opponents. In 1807, he settled as a physician in Paris, and there began lecturing and writing for the propagation of his opinions. As a foreigner teaching science to the French, he was discountenanced by Napoleon. 1808, March 14, he and Spurzheim presented to the Institute of France a Memoir of their discoveries, on which a committee of the members of that body (including Pinel, Portal, and Cuvier) drew up an unfavorable *Report*. Of this there is a translation in the *Edinburgh Medical and Surgical Journal*, 1809, Jan. Gall and Spurzheim thereupon published their *Memoir*, with a reply to the *Report*, in a vol. entitled *Recherches sur le Système Nerveux en général, et sur celui du Cerveau en particulier; suivi d'Observations sur le Rapport*, etc. (Paris 1809, 4to). This was followed by their larger work *Anatomie et Physiologie du*

Système Nerveux, etc. (Paris, 1810-19, 4 vols. 4to.), with an Atlas of 100 plates; but the two phrenologists having parted 1813, the name of Gall alone is prefixed to vols. III. and IV.; and it alone is borne by a reprint of the physiological portion of the work, entitled *Sur les Fonctions du Cerveau, et sur celles de chacune de ses Parties* (Paris, 1825, 6 vols. 8vo). Of the contents of that edition, there is a summary in the *Phrenological Journal*, X. 459. A German translation of it, entitled *Vollständige Geisteskunde*, etc., appeared at Nuremberg 1833; and an indifferent English version by Dr. Winslow Lewis, junior, at Boston, 1835 (6 vols. 12mo). A translation of the chapters *On the Functions of the Cerebellum* is included in a volume with that title, published by G. Combe (Edin. 1838, 8vo). In answer to accusations of materialism and fatalism brought against his system, Gall had early published a part of the work under the title of *Des Dispositions innées de l'Ame et de l'Esprit*, etc. (Paris 1812). He continued to practice medicine and pursue his researches at Montrouge, near Paris, till his death. A catalogue of his collection of skulls, etc., is printed in the *Phrenological Journal*, VI. and VII. As a thinker, he was original and independent; as an observer, industrious and persevering; as a writer and lecturer, forcible and clear. Even those, doubtless the large majority of modern students of mental science, who reject his system as insufficiently borne out by facts, allow that he has conferred signal service on science by his discoveries in the anatomy and physiology of the brain, and that by stirring to the bottom many questions regarding mind, and the organic conditions by which its phenomena are affected, he has contributed to deepen the foundations and broaden the applications of psychology. It is long since the apprehension of danger to religion and morality from his doctrines died away among the intelligent and well informed. In Great Britain and America phrenology became known less through Gall's writings than through those of Spurzheim, who went to England 1814. So early however, as 1803 it had been criticised in the *Edinburgh Review*, II. 147. See further, *Transactions of the Phrenological Society*, p. 1 (Edin. 1824); *Phrenological Journal*, V., VIII., IX., XI., XV., XVI., XVII., XIX.; *Historical Notice of the discovery of the Anatomy of the Brain*, appended to G. Combe's *Phrenology Applied to Painting and Sculpture*, p. 151 (Lond. 1855); Professor Laycock on *Mind and Brain*, II. 164, 168 (Edin. 1860).

GALL, St., *săng gâl:* one of the most important manufacturing towns of Switzerland, cap. of the canton of St. Gall, pleasantly situated on the left bank of the Steinach, 2,081 ft. above sea-level, 40 m. e.n.e from Zürich. It is a well-built town, surrounded by old walls: but the ditch has been filled up and converted into garden-grounds. Among the principal buildings are the Abbey Church, completely modernized in the last century; the monastery, portions of which are now occupied by public govt.

offices, and by the convent library, containing 1,506 MSS., among which are several of the classics at one time supposed to have been lost (see GALL, ST., ABBEY OF). The greatest building is the schoolhouse, which contains a natural history museum and the town library. The manufactures of St. Gall are chiefly cotton goods, particularly *Swiss muslins*. It has also linen manufactures, carries on bleaching and embroidery extensively, and is the great mart for the produce of Appenzell and Thurgau. Pop. (1901) 33,363.

GALL ST. (Ger. *St. Gallen*), ABBEY OF: celebrated Swiss Benedictine monastery, which gives its name to the canton in which it is situated. It was founded early in the 7th c. by St. Gall, or Gallus, Irish monk, disciple of Columbanus, one of that distinguished band who in that age from the various monasteries of Ireland and the kindred establishment of Iona carried the elements of learning and civilization over a large portion of the continent of Europe. Gallus had accompanied Columbanus to Anegray and Luxeuil; and ultimately he with a few followers repaired to Switzerland, where, in a hermitage on the banks of the Steinach, he acquired such fame for sanctity by his teaching and example that on his death there arose in his honor the monastery, which in time became one of the most celebrated of the many magnificent establishments of the Benedictine order. The succession of abbots from the days of Gallus is carefully chronicled, and the share which each had in the erection and enlargement of the monastic buildings. Through the munificence of the faithful, the abbey of St. Gall gradually became one of the master-pieces of mediæval architecture; and the genius and skill lavished on its construction, and on the decoration of its halls and cloisters, had a large share in developing the Christian art of the period. The monks of St. Gall were among the best friends and preservers of ancient literature. They were indefatigable in the collection and transcription of MSS.—biblical, patristic, sacred and profane history, classical, liturgical, and legendary. Some of the MSS. still shown in the library are monuments of the skill and industry of the copyists; and several of the classics, especially Quintilian, Silius Italicus, and Amianus Marcellinus, have been preserved solely through the MSS. of St. Gall. For a time the abbey was subject to the Bishop of Constance, and an animated dispute was long maintained between that prelate and the monks as to the right of electing the abbot. It ended in the recognition of the right of free election; and ultimately, from the growth of the monastic possessions and the important position which the abbot held, the monastic domain, which comprised a great part of n. Switzerland, became a distinct jurisdiction, within which the abbot, like many of his brethren in the great Benedictine monasteries, exercized the rights of a suzerain. For several centuries the abbey of St. Gall held one of the highest places in the

order; its members were distinguished among the scholars of mediæval Germany; and many of them, e.g., Notker, are known to have pursued, besides the ordinary learning, physic, mathematics, and astronomy. St. Gall was eminent for the cultivation of music, and its MSS. have been extensively used by the restorers of ancient ecclesiastical music. A town of considerable importance grew up around the monastery, and was called by the same name; and as the wealth and influence which attached to the dignity of the abbot began to make it an object of ambition to the rich and powerful families, the succession of abbots, in the 13th and 14th c., sadly degenerated from their pious and learned predecessors in the office. A stringent reform was enforced about the time of the Council of Constance; but the burghers of St. Gall had grown dissatisfied with the ancient rule; and on the outbreak of the Reformation, 1525, they threw off their subjection, and embraced the new doctrines. At the close, however, of the religious war, 1532, the Rom. Cath. religion was re-established, and the abbot reinstated; though with diminished authority. At the French Revolution the abbey of St. Gall was secularized (1798), and its revenues were soon afterward sequestrated (1805). By a later ecclesiastical arrangement the abbacy of St. Gall was raised to a bishopric, which, 1823, was united to that of Chur. They were afterward separated; and, 1847, St. Gallen was erected into a bishopric with a distinct jurisdiction.

GALL, St., CANTON OF: Swiss canton, bounded n. by Thurgau and the Lake of Constance, e. by the Vorarlberg, s. by the Grisons and Glarus, w. by Zürich and Schwytz. The country mostly is mountainous; the general slope of the surface being toward the n. and n.w. Several summits attain a height of 6,000 or 7,000 ft., one (the Gallanda) 8,800, and one (Schirbe) 9,000. The Rhine touches the canton of St. Gall near Pfeffers, and for about 50 m. forms its boundary. The chief rivers that intersect the canton are the Seez, the Tamina, and the Thur. Portions of the Lakes of Constance, Zürich, and Wallenstadt, lie within its boundaries. The chief produce consists of fruit, especially apples and cherries, wine, *kirschwasser*, corn, maize, and potatoes. Little grain is produced, and much land is applied to pasture. Iron is found in considerable abundance, and of good quality, at Gunzenberg; and coal, as also peat, is raised within the canton. The manufactures are of linen, muslin, cotton, lace, embroidery, and glass; and wax-bleaching and tanning are extensively carried on. The linen-manufacture is of very old standing; its seat is the chief town of St. Gall (q.v.), celebrated for linens as early as the 13th c.; but in later times the cotton manufacture has almost entirely taken its place.

The erection of St. Gall into a distinct canton is comparatively recent. It was formed at the secularization of the domain of the abbot by the union of the abbey

territory with several districts previously subject to the older cantons—viz., the Rheinthal, Sargans, Werdenberg, Sax, Gaster, Utznach, together with the town of Rapperschwyl; so that the new canton of St. Gall actually incloses on all sides the canton of Appenzell, which forms, as it were, an island within the new district. The language is a Swabian dialect of German. The canton of St. Gall sends eight members to the National Council. Its govt. is one of the most democratic in Switzerland. It consists of a Great Council, the members of which are chosen for two years by the votes of all citizens above 21 years; and who appoint from among themselves for four years an executive, called the lesser council, of seven members. The local prefects and other district officers are elected annually in their several districts. The area is 779 sq. m. Pop (1900) 250,285.

GALLAIT, *gâ-lā*, Louis: historical painter: b. Tournay, Belgium, 1810, May 10. He was educated in his native city, Antwerp, and Paris, where he lived many years, and exhibited frequently 1835-53. He was elected member of the Royal Acad. of Belgium, received a second-class medal in France in 1835, and the decoration of the Legion of Honor 1841, and became a foreign associate of the Paris Acad. of Fine Arts, succeeding Overbeck 1870. His paintings, large in size and replete with action, include *The Duke of Alba in the Netherlands, The Death of Palestrina, Job and His Friends, Montaigne Visiting Tasso, Baldwin crowned Emperor of Constantinople, The Abdication of Charles V., The Temptation of St. Anthony, The Last Honors paid to Counts Egmont and Horn after their Execution,* and *The Last Moments of Egmont.*

GALLAND, *gâ-lŏng′*, Antoine: 1646–1715, Feb. 17; b. Rollot near Montdidier, in Picardy: French orientalist and numismatist. In 1670 he accompanied the French ambassador, Nointel, to Constantinople, and went to Jerusalem and other places. He returned to France 1675, but subsequently twice visited the East. In 1701 he was made a member of the Académie des Inscriptions, and 1709 prof. of Arabic in the Collége de France. Galland's writings relate chiefly to numismatics; but the work which has given him reputation is his translation of the *Arabian Nights,* 12 vols. (*Mide et Une Nuits, Contes Arabes,* Paris 1704-17). This was the first translation of these grotesque and gorgeous stories ever made into any language of Christendom, and Galland was long credited with being the author rather than the translator. Among his writingc were *Paroles remarquables, bons Mots, et Maximes des Orientaux* (Paris 1694); and *Les Contes et Fables Indiennes de Bidpai et de Lokman* (2 vols., Paris 1724).

GALLANT, a. *găl′lănt* [OF. *gallant;* F. *galant,* courteous, gallant—from OF. *galer,* to rejoice; Scot. *callant,* a stripling, a lad: It. *galano,* quaint and gay in clothes;

galante, brave, handsome—from *gala*, show festivity]: manifesting bravery; magnanimous; daring; showy; GAL'LANTLY, ad. *-lĭ*. GAL'LANTRY, n. *-trĭ*, bravery, intrepidity; polite attention to women—often used in a bad or equivocal sense. GALLANT, v. *găl-lănt'*, to attend and wait on, as on a woman: N. a showy person; one polite and attentive to women; a lover; ADJ. attentive to ladies; courteous. GALLANT'ING, imp. GALLANT'ED, pp.—SYN. of 'gallant, a.': bold; brave; fearless; intrepid; courageous; undaunted; valiant; heroic; splendid; magnificent; chivalrous.

GALLA OX, *găl'la ŏks*, or SANGA: remarkable species or variety of ox inhabiting Abyssinia. The chief peculiarity is the extraordinary size of the horns, which rise from the forehead with an outward, and then an inward curve, producing a lyre-shaped figure, and finally curve a little outward at the tip, to which they taper gradually. In a specimen presented by Mr. Salt to the Museum of the College of Surgeons in London, the length of each horn measured round the outer side is three ft. ten and a half inches, the circumference of each at the base is one ft. three inches, the distance between the tips three ft. four inches. A space of about three or four inches between the horns is occupied by a tuft of hair. Bruce represents the enormous growth of the horns as a kind of disease or monstrosity, accompanied with emaciation of the animal. Salt controverts this account, yet figures the animal so as rather to confirm it. The Galla ox, however, differs from the common ox in having a hump on the shoulders, in the abrupt descent of the back toward the tail, in the greater length of the legs, and in the narrower space between the horns.

GALLARATE, *gâl-lâ-râ'tā:* market-town of n. Italy, province of Milan, on the e. side of the Somma hills, 24 m. n.w. of Milan. It is well built, has ancient walls and extensive steam cotton-mills. Pop. 6,000.

GALLAS, *gâl'lâz* ('invaders'): race inhabiting the s. and e. of Abyssinia. The general name by which the tribes designated themselves is *Oroma* (*orma*, men). Although generally of the negro race, they are not purely negroes, but with the Fulahs (q.v.), Mandingoes, and Nubas, form the transition to the Semitic variety, and seem to belong to that great family inhabiting e. Africa, from the frontiers of the Cape land to Abyssinia, usually denominated the Kafirs. The Gallas are a vigorous, well-formed people, of dark-brown color, with hair frizzled, but not quite woolly, round faces, and small sharp eyes, and are distinguished not less by their energy and warlike spirit, than by their mental capacities. They appear in history first in the 16th c. as a barbarous people, extending their conquests from the interior of Africa, laying waste by constant incursions the countries of e. Africa, to the mountains of Abyssinia, gradually subduing or expelling the original inhabitants (hence their

name), occupying great part of Abyssinia, and advancing as far as the Red Sea and the Gulf of Aden. It is only of late years that their power in Abyssinia, and their incursions into that country have been partially checked, chiefly by the vigorous government of the king of Shoa, who subdued some of the Gallas tribes, and induced them to profess such Christianity as exists in Abyssinia. They still, however, occupy many districts of Abyssinia, and extend their power to an indefinite extent over the countries s. and s.w. of it. Politically, the Gallas do not form a nation, but are divided into numerous tribes, forming separate kingdoms and states, frequently at war with each other. Most of the Gallas follow pastoral avocations. Some through intercourse with the semi-christian, semi-civilized Abyssinians, have become tillers of the soil. The wandering Gallas are engaged mainly in hunting and the slave-trade. The larger number of the Gallas are still heathens, though Mohammedanism has lately made progress among them. Their religion resembles that of the Kafirs.—Compare Jomard, *Notices sur les Gallas* (Paris 1839); Beke, *On the Origin of the Gallas* (London 1848).

GALLATE. See under GALL.

GALLATIN, *găl'a-tĭn*, ABRAHAM ALBERT ALPHONSE: 1761, Jan. 29—1849, Aug. 12; b. Geneva, Switzerland; of an old family known in Savoy 500 years before: financier and statesman. His parents died while he was young, nevertheless he received a good education at the College of Geneva, where he graduated 1779: In 1780 he came to the United States, then struggling for independence, and eagerly embraced their cause. He landed in Mass., and offered his services to Capt. John Allen, and so distinguished himself that he was speedily appointed commandant of Fort Passamaquoddy on the coast of Maine. When peace was restored 1783, he became teacher of French in Harvard College, but receiving his paternal inheritance soon afterward, purchased land, first in Va., and then in Penn., where he occupied himself with agricultural pursuits. He entered political life again 1789, when he was appointed a member of the convention for revising the state constitution of Pennsylvania. He was of the anti-federalist party; yet in 1793 he was elected a member of the U. S. senate from Penn., receiving the votes of both parties; but was refused his seat on a technicality. He was elected to the U. S. house of representatives 1795. In 1801 Pres. Jefferson appointed him sec. of the treasury, in which post he was of signal service to his adopted country, and showed financial ability of the highest order. In 1809 he became sec. of the treasury under Pres. Madison. He was one of the three commissioners for negotiation of peace with England 1814, and signed the treaty of Ghent. 1815-23 he was U. S. minister at Paris, and 1826 he was sent to London as ambassador extraordinary. On his return 1827, he settled at New York, and applied himself to lit-

erature, chiefly history and ethnology. 1831-39, he was pres. of the National Bank; and 1843 to his death, pres. of the New York Historical Soc. He was one of the founders, and first pres. of the Ethnological Soc. of America. Gallatin had great strength of character and marked intellectual force. His manner was somewhat reserved and austere. His services to the country merit grateful remembrance.

GALLAUDET, Edward Miner: an American educator; b. 1837, Feb. 5, son of Thomas H. Gallaudet. He organized the Columbian Institution for the Deaf, Dumb and Blind, at Washington, D. C., 1857, and five years later founded and became president of the Gallaudet College for the deaf, and there taught moral and political science. In 1886 he accepted an invitation of the British government to appear before the Royal Commission in the interest of the education of deaf mutes. He wrote *Life of Thomas Hopkins Gallaudet*, etc.

GALLAUDET, *găl-aw-dĕt*, Thomas, d.d.: Prot. Episc. clergyman: b. Hartford, 1822, June 3; d. 1902, Aug. 27; son of Thomas Hopkins Gallaudet. He graduated at Trinity College 1842, was a teacher in the New York Institution for Deaf-mutes 1843-58; was ordained deacon in the Prot. Episc. Church 1850, June; priest 1851, June; founded and became rector of St. Ann's Church, New York, for deaf-mutes, 1852, of which church he had charge till 1902, was appointed gen. manager of the Prot. Episc. Church Mission to Deaf-mutes 1872, pastor of the Sisterhood of the Good Shepherd 1869, chaplain of the Midnight Mission 1871; and founded the Gallaudet Home for Deaf-mutes near Newburg, N. Y., 1885. He received the degree d.d. from Trinity College 1862.

GALLAUDET, Thomas Hopkins, ll.d.: 1787, Dec. 10—1851, Sep. 9; b. Philadelphia: educator. He graduated at Yale College 1805, was tutor there 1808-10, studied at Andover Theol. Seminary 1811-14, was licensed to preach 1814, founded and became supt. of the American Asylum for Education of Deaf-mutes at Hartford; studied the systems of deaf-mute instruction in London. Edinburgh, and Paris 1814-16 (see Deaf mutes); and held the office of pres. of the institution 1817-30, resigning on account of ill health. He retained a seat in the directory of the asylum till death, and also was chaplain of the Conn. Retreat for the Insane from 1838 till death. He published numerous sermons, addresses, and juvenile works, and edited 6 volumes of *Annals of the Deaf and Dumb*.—His son, Edward Miner Gallaudet, ph.d., ll.d. (b. 1837, Feb. 5), founded the National Deaf-mute College, Washington, 1864, and has since been its pres. and prof. of moral and political science.

GALLE, Point de. See Point de Galle.

GALLEASS, n. *găl'lē-ăs* [F. *galeace*, or *galeasse:* It. *galleazza* (see Galley)]: a low-built vessel having both sails and oars; a vessel about a third larger than an ordinary galley, and rowed by 300 galley-slaves.

GALLEGO, *gâl-yā'gō:* one of the principal affluents of the Ebro. It rises at the s. base of the Pyrenees in the province of Huesca, Spain; flows s., and after a course of about 90 m., joins the Ebro a mile below Zaragoza.

GALLEGOS, *gâl-yā'gōs:* inhabitants of Galicia (q.v.), former n.w. province of Spain.

GALLEON, n. *găl'lē-ŏn*, or GALLOON, n. *găl-lôn'* [Sp. *galeon:* It. *galleone*, a great galley (see GALLEY)]: name applied formerly to ships-of-war of three or four gun-decks, but subsequently, to the large merchant-vessels which every year brought to Spain the gold, silver, and other wealth contributed by its Mexican and South American colonies. They were armed, but being heavy unmanageable vessels, and of immense value, were eagerly sought as prizes whenever a war broke out.

GALLERIA, n. *găl-lēr'ĭ-a* [L.L. *galeria*, a gallery, from the covered passage which the larva makes with wax in the beehives which it invades. Agassiz derives the name from Gr. *galeros*, pleasant]: typical genus of the *Galleridæ*, a family of moths, tribe *Pyralidina*. Two species live in beehives, doing great damage.

GALLERY, n. *găl'lĕr-ĭ* [F. *galerie*, gallery, lobby—from mid. L. *galēriă:* Lang. *galarié*, the rails of a staircase: Sw. *galler*, lattice]: long apartment serving as a communication to others; any long passage; the upper seats in a theatre; the raised floor round a church or public building (see below); collection of paintings, etc., and the place where they are arranged for inspection; in *mining*, a working drift or level from which the mineral has been excavated; in a *large ship*, a sort of balcony projecting from the stern or stern-quarters; an adjunct to the principal cabins; in *mil.*, covered passage formed through the earth or masonry in a fortification, either as a means of communication, or as a position whence a musketry-fire can be maintained through loopholes. For the latter purpose, galleries are formed occasionally in the counterscarps of dry ditches, where their defenders exercise a flanking fire upon the ditch. For listening galleries, see MINES, MILITARY.

GALLERY, in Architecture: see long passage or corridor or room; long passage in the thickness of the wall, or supported on cantilevers (as the Whispering Gallery of St. Paul's, London). Galleries were very frequent in the buildings of the middle ages. The Roodloft (q.v.) is a gallery running across a church at the entrance to the choir, and supporting a large cross. Organ galleries also are frequent, either in the position of the roodloft, or at one end of the nave or transept, or corbelled out from the side-wall. In old baronial halls, the end next the door was usually screened off for the domestics, and above the screen was almost invariably a gallery for musicians. In the older German and French churches, the side-aisles were divided into two stories—the upper forming a gal-

lery said to have been for the exclusive use of the women. The arrangement of galleries in tiers one over the other, now usual in theatres, and seen in some churches, is entirely modern, dating from the 17th century.

GALLEY, n. *găl'lĭ* [Icel. *galleyda;* mid. L. *galeida:* It. *gallera,* a galley: OF. *galie;* F. *galère,* a galley]: a one-decked vessel navigated with sails and oars, used in the Mediterranean; a light open boat, especially the captain's boat in a ship of war, usually propelled by six alternate oars; the kitchen or cooking-room of a vessel; in *printing,* the frame which receives the types from the composing-stick [F. *galée*]. THE GALLEYS, n. plu. *găl'lĭz,* galleys used as a place of punishment—galleys being generally rowed by slaves and criminals. GALLEY-SLAVE, a person condemned for a crime to work in a galley. See BAGNES.

GALLEY: long, low-built, narrow ship with one deck, much used in the Mediterranean prior to the introduction of steam, and still extant there. Galleys are propelled by sails and numerous oars, the latter being usually worked by convicts or galley-slaves, who are chained to them. The largest vessels of this class were those of the Venetians, some having a length of 162 ft., and carrying 12 guns; of these, *half-galleys* and *quarter-galleys* were diminutives. From their small elevation above the sea and swift movement, they were formidable enemies, even to much larger vessels, when smooth water gave play to their evolutions. During the great French war, numberless galleys, fitted as gun-boats, were ready to issue from the Mediterranean ports of Spain and France whenever a British ship was becalmed or disabled near the shore. The celebrated Algerine corsairs committed most of their piracies in swift galleys, commonly rowed by the forced labor of Christian slaves. The biremes were galleys with two banks, or longitudinal rows, of oars. This form of vessel permitted of a large increase in rowing power, in proportion to the bulk and weight of the vessel. It was the trireme, however, which formed the chief warship of Greece during her prime. It had three banks of oars on each side. The seats for the rowers, which were removable, were placed between the sides of the vessel and a series of upright and inclined timbers supporting the main deck. At the stern there was an elevated quarter-deck, whence the helmsman and the trierarch or naval captain gave their orders. The latter had full command of the ship; the former acted as navigating officer, having the oarsmen and sailors under his command. The trireme had regularly two masts—a mainmast with one large sail, and a very small foremast. The rowers formed much the largest portion of the crew, while an Attic trireme carried also 10 marines, 17 sailors, a sort of paymaster, two men in charge of the lines of towers, besides two boatswains, one with a flute, to give the time to the rowers. The total crew would thus be

about 220. The total length of a trireme was about 120 feet, of which about 100 was devoted to the rowers; the breadth at the water-line was some 12 feet; and the draught about 6 feet. A speed of 8 or 9 knots was probably about the highest obtainable.

GAL'LEY HALF'PENCE: coins of Genoa, brought into England by the galley-men, or men that came up in the galleys with wine or merchandise, and thence called galley halfpence. They were broader than the English halfpenny, but not so thick, and probably base metal, because, by 11 Hen. IV. c. 5, and 13 Hen. IV. c. 6 galley halfpence were prohibited as a legal tender. The galleys unloaded at the e. end of lower Thames Street, thence called Galley Quay, where, in the 17th c., were struck tradesmen's tokens, called Galley Quay halfpence (Timbs).

GALL-FLY (*Cynips*): Linnæan genus of insects, now forming the family *Gallicolæ* [Lat. gall-inhabiting] of entomologists, and belonging to the ord. *Hymenoptera* (q.v.), section *Terebrantia* [Lat. boring], which section is characterized by the females being furnished with an *ovipositor*. Gall-flies are nearly allied to ichneumons, but differ from them principally in depositing their eggs not in the bodies of the larvæ of other insects, nor in their nests, but in plants on whose juices their larvæ are nourished. The ovipositor of the female is long, slender, in part spirally rolled up when not in use, and lodged in a groove on the under-side of the abdomen, near the origin of which it is attached; it has at its extremity lateral teeth forming a kind of saw. By means of this organ, the insect makes a minute puncture where she is to deposit her egg, which is sometimes in a leaf, and then generally in one of the ribs of the leaf; sometimes in a young shoot or twig; sometimes in a bud, or in some other part of a plant, not excepting the roots; each species of gall-fly choosing some particular plant, and some particular part of a plant, to which it confines its attacks. An irritant fluid is supposed to be lodged in the puncture with the minute egg, as a tumor immediately begins to form, becoming an excrescence known as a *gall:* see GALL, or GALL-NUT. The egg itself increases in size before it is hatched; the gall very rapidly attains its full dimensions; and within it the larvæ of the gall-fly feeds on the juices of the plant in their most concentrated form; for galls are found to contain the peculiar principles of the plants on which they grow in greater abundance than the adjoining or other parts. It is not until the larva has undergone its transformations, first into the *pupa,* and then into the perfect insect, that it eats its way out of the gall in which it has previously existed.

GALLI, n. *găl'lī* [L., said to be from *Gallus,* river in Phrygia, which made those mad who drank of it]: in *Rom. antiq.,* priests of Cybele at Rome. They carried round the image of Cybele like people in a state of frenzy,

rolling their heads, beating their breasts to the sound of flutes and uttering dreadful predictions. The Galli alone of all the heathen priesthood, in ancient Rome, were permitted to ask alms from the people. GALLIAMBIC, n. *găl-lĭ-ăm'bĭk* [L. *galliambicus*, song used by the Galli or priests of Cybele]: kind of verse, consisting of two iambic dimeters catalectic, the last wanting the final syllable.

GALLIARD, n. *găl'yărd* [F. *gaillard*, sprightly, merry —from *gai*, sprightly: comp. Gael. *gille*, a youth; *araideach*, joyous, merry: Ir. Gael. *galach*, valiant, brave]: in *OE.*, a gallant, gay, lively man: [Sp. *gallarda*, an airy Spanish dance]: in *OE.*, a lively, nimble dance; the same, according to Brossard, as the *Romanesca*, a favorite dance with the Italians. The air is mostly in $\frac{3}{8}$ or $\frac{3}{4}$ time, but sometimes in $\frac{2}{4}$ or $\frac{4}{4}$ time. The tempo is also quick and lively, with a flowing melody. A writer in *Notes and Queries* (VII. 216, 217) says that he knows at least a hundred different Galliard tunes, distinguished by different names, probably to indicate with whom they were favorites, such as *The King of Denmark's Galliard; The Earl of Essex's Galliard;* etc.

GALLIC, a. *găl'lĭk* [L. *Gallĭă*, Gaul, ancient name of France]: pertaining to Gaul or France; also GAL'LICAN, a. *-ĭ-kăn*. GAL'LICIZE, *v. -lĭ-sīz*, to render French. GAL'LICISM, n. *-lĭ-sĭzm*, a French idiom or form of expression.

GALLIC ACID: $HC_7H_5O_5,H_2O$, an acid which exists in small quantity in gall-nuts, in valonia (the acorn-cup of *Quercus œgilops*), in dividivi (the pod of *Cœsalpinia coriaria*), in sumach, and other vegetables. It is usually prepared from gall-nuts, which, in addition to gallic acid, contain a large proportion of tannin (tannic acid or gallotannic acid). When the gall-nuts are digested with water for some weeks fermentation takes place, and the tannic acid is gradually converted into gallic acid. The same result is obtained more quickly if sulphuric acid be present. To obtain pure gallic acid the gall-nuts are boiled with water, and the hot liquor separated. On cooling gallic acid crystallizes out, and is further purified by solution in hot water and treatment with animal charcoal. It forms delicate, silky, acicular crystals, nearly colorless, and having a sourish taste. It is soluble in three parts of boiling water, but only in 100 of cold water, and on this account it can be readily purified by recrystallization. With solution of iron salts (ferric) it produces a blue-black color, and finally yields a black precipitate on exposure to the air. Hence it may be used in the production of ink, for which purpose it has some advantages over tannin or gall-nuts.

In medicine gallic acid is used as an astringent. In most respects its action is similar to that of tannic acid (q.v.), but it does not coagulate albumen, and therefore does not possess the local action as an astringent. It is readily absorbed into the blood and in this way is efficacious in Bright's Disease.

GALLICAN CHURCH, *găl'lĭ-kan:* distinctive title of the Rom. Cath. Church in France. It is the Church of France, considered less in relation to geographical boundaries than in its constitution and principles of church government. The Christian faith was widely diffused in France or Gaul, even during the lifetime of the apostles; and it especially flourished among the descendants of the Greek colonies of the south, and in the numerous towns and cities on the Rhone and its confluent rivers. In the persecutions to which the early professors of Christianity were subjected, the Christians of these churches had their full share; and one of the most touching monuments of early Christian literature, is the letter of the Christians of Lyon and Vienne to their brethren in Asia, on the martyrs of these churches, which Eusebius has preserved in his *Ecclesiastical History* (book v. c. 1). Although sharing in the general literary inferiority to their Eastern brethren which characterizes Western ecclesiastics during the early period, the church of Gaul numbers several eminent names in the literature of the 3d, 4th, and 5th c. The works of Irenæus, Bp. of Lyon, are among the most important for the history of doctrine of all the early patristic remains; and in the following century, Sulpicius Severus, Hilary of Poitiers, Hilary of Arles, Vincent of Lerins, Prosper, Victor, Eucherius, Salvian, and Gregory of Tours, combine to form a body of literature of which the later modern representatives of the French Church are reasonably proud. The hierarchical organization, also, of the church of Gaul was, at a very early period, among the most complete and regular throughout the churches of western Christendom; and in the council at Arles 314 may be recognized the titles of many bishops of sees still represented in the catalogue of the French episcopacy.

History of Gallicanism.—The history of the Gallican Church, so far as regards the development of those peculiar principles which have acquired a distinctive name and status in Rom. Cath. theology, begins at a much later period. For the origin and progress of the temporal power of the papacy, see PAPACY. It is enough here to observe that, from circumstances differently viewed by the opposite schools of theology, the Roman pontiffs began, from the very date of the establishment of the Western Empire, to exercise a large and widely extended influence over the civil as well as ecclesiastical affairs of the several European kingdoms. On the other hand, owing to the intimate connection between the church and state in most of these kingdoms, and especially to the feudal relations between the crown and the church dignitaries, most of whom held the temporalities of their benefices under the crown by the ordinary feudatory tenure, the crown also asserted a correlative claim to certain privileges in respect to ecclesiastical affairs. The satisfactory adjustment of these conflicting claims was the great problem of mediæval polity. More than

one of the French sovereigns engaged in a conflict with the Roman see as to the respective authority of the two powers; these conflicts naturally called out a division of opinion among the members of the church of France, one party supporting the papal claims, and the other maintaining the adverse prerogatives of the French crown, and the privileges of the national church of France. The latter party professing to represent the rights of the Gallican Church, have given a name to the principles which they profess; and the appellation of Gallicanism has come to designate, in general, that system in Rom. Cath. theology which, while it recognizes the primacy of the Roman pontiff, by divine right, over the universal church, yet asserts the independence of national churches in many details of self-government and of local discipline, and limits the exercise of the papal prerogatives by canons and decrees of general councils and by the laws of the universal church. It must be added that, while the Gallican theory to this extent claims an exemption from dependence upon the authority of the Roman pontiff, it acquiesces, on the other hand, to an almost proportionate degree, in the assumption of ecclesiastical authority on the part of the state. Gallicanism, in truth, in many of its details, falls into the grossest form of Erastianism.

We can recognize the working of these principles in the opposition which the so-called Isidorian Decretals (see ISIDORIAN DESCRETALS; HINCMAR) encountered in France; and though the body of the clergy stood aloof, these principles were carried to their extreme extent by Philippe le Bel (or Philip the Handsome) in his contest with Boniface VIII. The conflicting claims of the rival popes in the Western Schism (see WESTERN SCHISM) tended still more to weaken the papal authority; and the expedient then adopted for the extinction of the schism—viz., that of convening a general council to pronounce upon the respective claims of the pretenders to the papacy, gave prominence and significancy to what has since been regarded as one of the leading dogmas of Gallicanism—the superiority in point of authority of a general council to the pope. The details, too, of the disciplinary enactments of the councils of Constance and Basel, which were drawn up in this spirit, were directed mainly toward the limitation of the papal authority in the exercise of church patronage within the limits of the national church; and these enactments were in the main embodied into the French law by the celebrated Pragmatic Sanction of 1438. See PRAGMATIC SANCTION.

The Pragmatic Sanction was superseded 1512 by the concordat of Leo X. with Francis I. The patronage which the French crown held under that concordat had the effect of still further nationalizing the French Church, and increasing at once the subserviency of the clergy and the jealousy of the crown as to the papal

interference. The great jurists, Pithou and Dupin, in asserting the liberties of the church, equally enforced the privileges of the crown. In the development of the absolutism of the monarchy, which reached its height under Louis XIV., the ecclesiastical prerogative of the crown was enlarged as much as its political authority; and a contest between this monarch and Innocent XI., on the right of the crown to the so-called *Droit de Regale* (see REGALIA), led to the well-known Declaration of the French Clergy 1682, since regarded as the charter of Gallicanism. This formulary emanated from an assembly of the French clergy, held by royal authority 1682, at which the celebrated Bossuet was present. It consists of four articles. The first declares that 'the jurisdiction of St. Peter and his successors in the Roman see as vicars of Christ on earth, though divinely bestowed, is confined to things spiritual and appertaining to salvation, and does not extend to civil or temporal affairs.' The article therefore declares 'that princes are not subject in temporal things to any ecclesiastical authority;' that they cannot be deposed 'either directly or indirectly by the power of the keys, and that their subjects cannot be dispensed from their subjection or released from their allegiance.' The second article renews the declaration of the Council of Constance with regard to the superiority of a general council over the pope, and declares that that article is not to be restricted in its application to a period of schism such as existed at the time of the council. The third asserts that the authority of the pope is 'to be restricted by the canons of the universal church,' and that 'the rules, customs, and institutions of the Gallican kingdom and church remain in full force.' This is the article which asserts the celebrated 'Gallican Liberties.' The fourth article, while it concedes to the pope 'the chief part in questions of faith,' and professes that 'his decrees extend to each and every church,' nevertheless maintains 'that his judgment is not irreformable, unless it shall have been confirmed by the consent of the entire church.' The chief rules, customs, and institutions of the Gallican Church referred to in the third article are, that the Gallican Church does not receive all the decrees of councils and of popes in matters of discipline, and that those only are in force which are so received; that the Gallican Church holds itself free to receive or reject the rules of the Roman chancery; that the Roman pontiff cannot levy any impost from the French clergy without their own consent; that he cannot bestow of his own motion on a foreigner any benefice within the French Church; that neither he nor his legates can hear French causes in 'the first instance,' and that even in cases of appeal he is bound to assign native judges to hear the appeal, even when the appellant is a metropolitan or primate; that the French bishops shall not be required to attend any general

council unless with the permission of the crown. The last of these 'customs,' as also those which make the receiving or not receiving the general canons of discipline optional in France, and which practically throw the decision into the hands of the civil power, have been with much show of reason denominated the 'Slaveries' rather than the 'Liberties' of the Gallican Church.

This 'Declaration' was strenuously enforced by Louis XIV.; but it was in the same proportion distasteful to the popes. It was condemned by Alexander VIII. 1690, by Clement XI. 1706, and by Pius VI. 1794; but both the acceptance of the articles and their condemnation were understood to be with certain reservations. Within the present century, and especially since the late collision between the civil and ecclesiastical authority, the opinions of the French clergy underwent a decided change. The Gallican doctrines were much less commonly held, and in a less extreme form, and where the same doctrines were adopted in other national churches, and especially in Germany (see FEBRONIANISM), under Joseph II., they fell into similar discredit with the church party. The climax of this reaction has been seen in the conduct of the French bishops at the late Vatican Council, in which a great body of them were foremost in renouncing the Gallican articles, and accepting the doctrine of Papal Infallibility; and even those who contended for the opposite view, in the end acquiesced in the decision of the majority.

GALLIENUS, *gál-lĭ-ē nŭs*, PUBLIUS LICINIUS, Roman Emperor: d. 268 (reigned 260-268); son of Valerian who had made him co-regent with himself and who was taken prisoner by the Persians 260. Gallienus' authority was limited almost entirely to Italy, for throughout the provinces the legions for the most part revolted, and raised their commanders to the dignity of Cæsars. Hence the period is known in history as the Time of the Thirty Tyrants. In the East, the honor of the Roman arms was maintained by Aurelian, Probus, and others, who found a useful ally in Odenathus, ruler of Palmyra, and his wife Zenobia (q.v.), to whom Gallienus intrusted the care of the war against the Persians. In the West, however, dangers thickened about him. Aureolus was proclaimed emperor by the legions of Illyricum, and having marched into Italy, seized Milan, and proceeded toward Rome. The war between the two was carried on for some time with undecided success, but Gallienus, while besieging his adversary in Mediolanum (Milan), was murdered by some of his officers. He was succeeded by Claudius II.

GALLIFET, GASTON ALEXANDRE AUGUSTE, Marquis de: a French military officer; b. 1831 in Paris; entered the army 1848; commissioned colonel 1867; served in the army of the Rhine in command of the 3d Regiment of Chasseurs d' Afrique, through the Franco-German War; promoted to the rank of general of brigade 1870;

and in the second siege of Paris commanded a brigade of the Army of Versailles. In 1872 was sent to Africa and placed at the head of the sub-division of Batna; commanded the expedition to El-Goliah, Africa, and subdued the revolting tribes; on the reorganization of the army was placed in command of the 3d brigade of infantry of the 8th army corps of the sub-division of the Department of Cher; given command of the 5th division of infantry, 1875; and became commmander of the 9th corps, 1879. In 1885 he was member of the council of war and in 1899 became minister of war.

GALLIGASKINS, n. plu. *găl'lĭ-găs'kĭnz* [F. *Gregues-que*, Greek or Grecian: comp. Gael. *gille*, a youth; *gas-gan*, an appendage]: leather protectors or hose for the legs of sportsmen during shooting excursions, etc.; loose wide breeches, such as the canvas overalls worn by fishermen.

GALLIMAUFRY, n. *găl'ĭ-maw'frĭ* [F. *galimafrée*, hotch-potch: comp. Gael. *gail*, to boil or stew; *maith*, good; *frith*, little]: in *OE.*, a stew or boiled dish of good little scraps; a dish made of remnants chopped up; a ridiculous medley; a woman of a mixed character, neither one thing nor another.

GALLINACEOUS BIRDS, a. *găl'lĭ-nā'shŭs* [L. *gallinācĕŭs*, pert. to domestic fowls—from *gallīnă*, a hen; F. *gallinacé*], or RASORES [Lat. scrapers]: order of birds, more generally valuable to man than any other order, containing at once the most important species domesticated as poultry, and those most sought as game. The common domestic fowl may be regarded as type of the order. Like it, the Gallinaceous birds in general have a small head; a rather short bill, with the upper mandible a little arched; nostrils on the sides of the bill, and usually in a soft membranous space at its base; the figure bulky; the wings short, and not governed by powerful muscles, nor adapted for long or rapid flight; the feet with three toes before, and one behind—which is articulated higher than the others, and is sometimes wanting—adapted for walking on the ground and for scraping, which is much resorted to, to procure food and for other purposes; the digestive organs complex, the *crop* large, the *gizzard* very muscular, the *intestine* long, with two very large *cœca*. The head, at least of the males, is generally furnished with appendages, as a crest, comb, wattles, etc. The feet of the males are also furnished with *spurs*, and at least during the breeding season the males are very quarrelsome. The males of many species are birds of splendid plumage; that of the females is sober, but females of very advanced age often assume a plumage similar to that of the males. Some of the Gallinaceous birds are polygamous, some pair at the breeding season; the nest of all is artless, and the males take no part in incubation, nor in the rearing of the young. The young are comparatively

feathered when hatched, and are immediately able to run about and pick up food for themselves, but are for some time affectionately tended and protected by the mother, and by her the proper food is sought for them and pointed out to them, or broken into sufficiently small pieces, and laid before them. The Gallinaceous birds have unmelodious voices. Except the curassows, they make their nests on the ground. Some of them are found in almost all parts of the world. Besides those already named, guans, pheasants, grouse, partridges, quails, ptarmigans, peacocks, turkeys, guinea-fowls, tragopans, and tinamous, are examples of this order. Pigeons are generally ranked in by ornithologists, but rather doubtfully, as they differ not a little from the true Gallinaceous birds: see COLUMBIDÆ. Interesting analogies have been pointed out between this order of birds and the order of Ruminants among Mammals in the complexity of the digestive organs, bulkiness of the frame, low intelligence, easy domestication, usefulness to man, and proneness to variation from the influence of external circumstances, giving rise to different breeds. GALLINACEI, n. plu. *găl'lĭ-nā'sē-ī*, that section of rasorial birds of which the common barn-fowl is a typical example.

GALLINULE, *găl'lĭ-nūl* (*Gallinula*): genus of birds of the family *Rallidæ*, closely allied to the Coots (q.v.), and having the upper mandible similarly extending on the forehead in a naked soft plate, but the toes furnished with an undivided narrow marginal membrane. This membrane, however, and the great length of the toes, enable the gallinules to swim well, and all are aquatic. The species are numerous, some confined to tropical regions. The COMMON GALLINULE (*G. chloropus*) is known also as the WATER-HEN, or MOOR-HEN, a very widely diffused species, found in most parts of the world. The gallinule is about 13 inches in length, the tail very short; the general color of the plumage deep olive brown on the upper parts, blackish gray beneath, the ridge of the wing and the under tail-coverts white. The bill is red at the base, and yellowish green at the tip; the legs and toes green. In situations favorable for them, such as artificial ponds, gallinules are sometimes seen in considerable numbers together, swimming with a peculiar nodding of the head. They seek their food both on the surface of the water and by diving, partly also among the grass of meadows and river-banks. A frequent jerking of the tail is very characteristic of them. When alarmed, they sometimes seek safety by flight, but more frequently by hiding among rushes or reeds. They make their nests near the water which they frequent, and usually on the ground among stumps, roots, and reeds; the nest contains seven to ten eggs. The flesh is well flavored.

GALLIO, *găl'lĭ-o*, JUNIUS ANNÆUS: proconsul of

Achaia under Claudius A.D. 53-4. He was son of Annæus Seneca, noted rhetorician of Rome; and Lucius Annæus Seneca, philosopher, and Lucius Annæus Mela, geographer, were his brothers. His own name was Marcus Annæus Novatus, but on being adopted by Junius Gallio, the rhetorician, he assumed his name. His early education was conducted by his father at Cordova, and he rose to such favor that he became proconsul of Achaia, with residence at Corinth, A.D. 53. Little is known positively about him beyond the brief narrative in Acts xviii. 12-17. It is believed that Gallio was banished to Corsica with his brothers by Messalina, and recalled by Agrippina, who chose Seneca to become Nero's teacher. He was in Rome in the fifth year of Nero's reign, and is said by Jerome to have commmitted suicide A.D. 65.

GALLIOT. See GALIOT.

GALLIPOLI, *gâl-lĭp'o-lē* (*Callipolis* of the Greeks): important commercial town of s. Italy, the province of Lecce, beautifully situated on the e. shore of the Gulf of Taranto, on a steep isolated rock in the sea, connected with the mainland by a fine arched bridge of stone. It has a good harbor, although somewhat difficult of access, because of the rocks surrounding its entrance; in time of war is an important position, being strongly protected by fortifications and a castle, as well as by peculiarity of its site. Gallipoli is remarkable for its oil-tanks, excavated in the solid limestone, in which the famous oil of Puglia is deposited for exportation. In one year the revenue from the oil-trade amounted to more than 8,000,000 francs. Gallipoli is the see of a bishop. Other interesting features of the place are the ancient fountain, a fine monument of antiquity, adorned with antique figures in bas-relief; the castle, erected by Charles of Anjou, commanding the port and bridge, and of considerable defensive strength; and the cathedral, erected 1629 by Francesco Bischettini, containing some fine paintings of Coppola. It is said that Christianity was introduced here as early as A.D. 44. In 450, the town was sacked by the Vandals; 1284, it was destroyed and almost depopulated by Charles of Anjou; and during subsequent centuries, suffered severely from the Venetians, French, Spaniards, and Turks. See *Viaggi in Sicilia ed in Galeipoli*, by Baron Riedesel. Pop. over 10,000.

GALLIP'OLI: important town and seaport of Turkey in Europe, province of Adrianople, on the peninsula of G., at the n.e. extremity of the strait of the Dardanelles, 90 m. s. of Adrianople, about 130 m. w.s.w. of Constantinople. It was formerly fortified, but its only defense now is 'a sorry square castle with an old tower.' It is the most important town on the Hellespont, has two ports, numerous fountains and mosques; and its merchants, comprising men of all nations, carry on

flourishing trade in grain, wine, oil, etc. The exports have an annual value of over $1,000,000; the imports, of $750,000. Gallipoli is the see of a Greek bishop. In the town and neighborhood are many remains of ancient sculpture and architecture, the most noteworthy of which are the magazines and cellars built by Justinian. The town was taken by the Turks 1357, and formed their earliest European possession. Pop. about 20,000.

GALLIP'OLI, PENINSULA OF (anc. Thracian Chersonesus): portion of the province of Adrianople, European Turkey, between 40° 3′ and 40° 38′ n.; separating the strait of Dardanelles on the e. from the Gulf of Saros on the w. It extends s.w. about 55 m. varying from 4 to 13 m. in breadth.

GALLIPOLIS, *găl-lĭ-po-lĭs′:* city, cap. of Gallia co., O.; on the Ohio river, the Columbus, Hocking Valley and Toledo, Toledo and Ohio Central, and other railroads, midway between Pittsburg and Cincinnati, 56 m. s.e. of Chillicothe. Gallipolis was settled by French immigrants in 1790. It is the seat of Gallia Academy, has a good public school system, public library and park, municipal waterworks, etc. It has woolen and planing mills, foundries, furniture and wood-working factories, tanneries, etc. Was an important supply depot during the Civil War. Pop. (1900) 5,432.

GALLIPOT, n. *găl′lĭ-pŏt* [Dut. *gley*, clay; *gley-pot*, earthen pot]: painted and glazed pot or vessel, commonly used by druggists to contain medicine.

GALLISSONNIÉRE, *gâ-lē-son-yär′*, ROLAND MICHEL BARRIN, Marquis de la: 1693, Nov. 11—1756, Oct. 26; b. Rochefort: gov.gen. of Canada. He entered the French navy 1710, rose to the rank of capt., and was appointed gov.gen. of Canada 1745. He made friends with the Indians, planned and established a line of forts and trading-stations between Canada and La., had a variety of trouble with the English in the Ohio valley and Nova Scotia, and returned to France 1749. He was promoted to the rank of chief of squadron, and was several years in charge of the bureau of maps and charts, where he performed much valuable scientific work. In 1756 he defeated the English admiral Byng off Minorca, then blockaded by the French. Byng's failure to relieve the place led to his being shot under sentence of the court, and Gallissonnière's health was so impaired by the excitement of the engagement that he was compelled to resign, and soon died.

GALLIUM, *găl′lĭ-ŭm* [named in honor of France]: metallic element, discovered 1875 during the spectroscopic examination of zinc-blende, symbol Ga, atomic weight 69·9, specific gravity 5·95. It is obtained by dissolving the blende in sulphuric acid and placing in the solution plates of zinc. A precipitate containing gallium as a hydrated oxide is thus obtained, and after fur-

ther solution and precipitation metallic gallium is thrown down by zinc. Gallium is grayish white, crystallizes as an octahedron, is very hard, and but slightly malleable or flexible. It gives a brilliant violet line in the spectrum. When melted it adheres to glass.

GALLIVAT, *găl'lĭ-văt:* large row-boat, formerly, and still to some extent, used in eastern waters. They rarely exceed 70 tons, carry two masts with high triangular sails, and are generally armed with a few small swivel guns fastened on the bulwarks. The Malay pirates employ these swift but fragile vessels.

GALLIWASP, n. *găl'lĭ-wâsp: Cetestus occiduus*, small lizard, family *Scincidæ*, found in the W. Indies. It is an object of terror to the inhabitants, but is really harmless.

GALLOMANIA, *găl-lo-mā'nĭ-a:* imitation of French literature and customs, prevalent in Germany in the time of Frederick II. of Prussia, and developed in the writings of Wieland.

GALLON, n. *găl'lŭn* [Sp. and OF. *galon*, a gallon: F. *jale*, an earthen jar]: liquid or dry measure containing four quarts; standard measure for liquids in the United States, and the standard liquid and dry measure in Great Britain. It has been in use from the earliest times, and in consequence has undergone many changes. In the time of Henry III., it was enacted that the gallon should be 8 lbs. of 12 ounces each, an ounce being the weight of 640 dry grains of wheat from the middle of the ear. In 1650, there were three distinct gallon measures—1, the gallon measure in common use, which contained about 231 cubic inches: 2, the customary standard at the Guildhall, which though not a legal standard, was frequently referred to as such, even by the law-officers of the crown; and though generally estimated at 231 cubic inches, in reality contained only 224: 3, the legal standard measure, preserved at the treasury, which contained 282 cubic inches.—Besides these three, there was another gallon measure frequently used for grain, called the Winchester gallon, which though directed in William III.'s reign to contain 269 cubic inches, was soon afterward changed to 272¼ cubic inches, at which value it long remained. In 1706, the gallon of 231 cubic inches was made the standard wine gallon. These measures in Britain were gradually changed in value, and appropriated to the measurement of particular substances, till, 1825, just before the passing of the 'Act for Ascertaining and Establishing Uniformity of Weights and Measures,' they stood thus:

In old dry or corn measure,	the gallon	=268·6	cubic inches.
In old wine measure,	" "	=230·85	" "
In old ale and beer measure,	" "	=282·	" "

In 1826, Jan., when the above-mentioned act came into operation, all these measures were abolished, and it was enacted that the standard measure of capacity for all

liquids and for dry articles not measured by heaping, shall be a gallon containing 10 lbs. avoird. of distilled water weighed in air (the barometer being at 30 inches, and the thermometer at 62°). This gives 277·274 cubic inches for the imperial gallon, and by subdivision or multiplication of this standard, the other measures can easily be found. See WEIGHTS AND MEASURES.

GALLOON, n. *găl-lôn'* [F. and Sp. *galon*—from F. and It. *gala*, pomp, show]: narrow fabric of silk or worsted, or of both, sometimes of cotton, of gold, etc.; used for binding garments, curtains, etc. The small band worn round gentlemen's hats is an example.

GALLOP, n. *găl'lŭp* [F. *galoper;* It. *galoppare*, to gallop: imitative of the sound of the footfall of a horse repeated at regular intervals—from old Flem. *walop*, a gallop]: the swift forward movement of a horse or other animal by springs or leaps; the quickest pace of a horse: V. to move forward swiftly, as a horse. GAL'LOPING, imp.; ADJ. rapid: N. the act of. GAL'LOPED, pp. *-lŭpt*. GAL'LOPER, n. *-ėr*, one who. GAL'LOPADE, n. *-lō-pâd* [F. *galopade*]: a sidelong kind of gallop; a dance, and the music appropriate to it. GAL'LOPA'DING, n. the act of dancing a gallopade: ADJ. dancing a gallopade; moving about briskly. HAND-GALLOP, a gallop, but not at full speed.

GALLOTANNIC AC'ID, *găl-lo-tăn'ĭk* ($C_{27}H_{22}O_{17}$): the most important of the various forms of tannin or tannic acid. It occurs usually as a spongy, light, inodorous, colorless, or faintly yellow mass, easily reduced to a fine powder, which has a strongly astringent, but not bitter taste. It is freely soluble in water, the solution reddening litmus paper, and dissolving the carbonates with effervescence. With the persalts of iron, gallotannic acid gives a blackish-blue precipitate of gallotannate of iron, and even when the iron solution is extremely dilute, a violet tint is evolved. This gallotannate of iron is the basis of ordinary writing ink (q.v.); and the reaction described is so sensitive that gallotannic acid is used in the laboratory as a test for the detection of the persalts of iron. Gallotannic acid precipitates likewise tartar emetic, nearly all the vegetable alkaloids (morphia, quinia, etc.), the albuminates, and gelatine. If a piece of raw hide, freed from hair, be immersed in a solution of gallotannic acid, the gelatigenous tissue and the acid combine, and leather is formed; and if the skin be of sufficient size, all the gallotannic acid is removed from the solution.

Gallotannic acid fuses when exposed to heat, and at a temperature of about 120° it is decomposed, and yields pyrogallic acid ($C_6H_6O_3$) and metagallic acid ($C_6H_4O_2$), while water and carbonic acid are expelled. When a watery solution of gallotannic acid is excluded from the air, it remains unchanged: but if the air is allowed free access, a fungous or moldy growth is developed, oxygen

is absorbed, carbonic acid is given off and the gallotannic acid becomes decomposed into Gallic acid (q.v.) and sugar. The same decomposition is more rapidly induced by the action of dilute sulphuric acid, the reaction being exhibited in the following formula:

$$\overbrace{C_{27}H_{22}O_{17}}^{\text{Gallotannic Acid.}} + \overbrace{4H_2O}^{\text{Water.}} = \overbrace{3(C_7H_6O_5)}^{\text{Gallic Acid.}} + \overbrace{C_6H_{12}O_6}^{\text{Sugar.}}$$

On boiling gallotannic acid in a concentrated solution of potash, gallic acid is also formed.

The composition of the salts of this acid is imperfectly known, but the acid is generally considered as tribasic. None of the salts crystallize, and when in solution or in a moist state, they rapidly absorb oxygen, and become decomposed.

Gallotannic acid occurs in large quantity in the gall-nut, which contains, according to Pelouze, as much as 40 per cent. of this acid, and 3·5 per cent. of gallic acid (Guibourt has found that some nuts contain as much as 65 per cent. of gallotannic acid), it is found likewise in all parts of the gall or dyer's oak (*Quercus infectoria*), in sumach (*Rhus coriaria*), and in green tea. The best method of obtaining it is from powdered gall-nuts, by extraction with commercial ether (which contains about 10 per cent. of water), in the percolation or displacement apparatus.

Gallotannic acid is employed in medicine, chemistry, and the arts. Its uses in medicine are due to its powerful astringent action. It is used topically as a styptic in wounds, bleeding gums, piles, etc., and internally as an astringent in hemorrhage from the lungs, stomach, bowels, etc.; as we know that it becomes converted into gallic acid in its passage through the system, it is probably the latter acid which acts on remote parts when gallotannic acid is administered. Internally, it may be given in doses of three to ten grains, three or four times a day, in pills or in solution. It may be used as an astringent gargle or lotion, in the form of a watery solution containing three or more grains to the ounce. The *compound ointment of galls*, the best topical remedy for piles without hemorrhage, owes its efficacy to the gallotannic acid in the powdered galls. In chemistry, it is used in solution as a test for gelatine, persalts of iron, etc.; and in the arts it serves various useful processes, especially in the preparation of leather, and the manufacture of white wines. Schiff assigns it the formula $C_{14}H_{19}O_9$.

GALLOW, v. *găl'lō* [AS. *agœlwian*, to astonish]: in *OE.*, to frighten; to terrify. GAL'LOWING, imp. GALLOWED, pp. *găl'lōd*.

GAL'LOWAY, BEVERLY THOMAS, American horticulturist: b. Millersburg, Mo., 1863, Oct. 16. He was graduated from the University of Missouri, agricultural course, in 1884; was assistant in the horticultural department

of the university in 1884-86, and in the United States Department of Agriculture, division of vegetable physiology and pathology, in 1887-8. In 1900 he became director of the office of plant industry. His writings include works on plant diseases, botany, horticulture, and allied subjects.

GALLOWAY, Charles Betts, American bishop of the Methodist Episcopal Church, South: b. Kosciusko, Miss., 1849, Sept. 1. In 1868 he entered the Mississippi conference, and for several years he was pastor of various churches in that State. From 1882 until 1886 he was editor of the New Orleans *Christian Advocate.* He was also elected president of the board of education of his Church, and published a *Life of Bishop Linus Parker; Hand-book of Prohibition; Open Letters on Prohibition,* written during his controversy with Jefferson Davis on that subject; *Modern Missions: Their Evidential Value;* and *Christianity and the American Commonwealth.*

GALLOWAY, Joseph, American lawyer: b. near West River, Md., about 1729; d. Hertfordshire, England, 1803, Aug. 29. He was admitted to the bar in Philadelphia, and was a member of the Pennsylvania Assembly 1757-74. He held a seat in the Congress of 1774, where he suggested a plan of government headed by a president-general to be appointed by the king and to hold office during the latter's pleasure, and a grand council selected every three years by the assemblies of the several colonies. Before the conclusion of the Revolutionary War he removed to England; and in 1788 was charged with high treason by the Assembly of Pennsylvania, which ordered his estates to be sold. He was the author of: *A Candid Examination of the Mutual Claims of Great Britain and the Colonies: with a plan of accommodation on Constitutional Principles* (1780); *History and Political Reflections on the American Rebellion* (1780); etc. Consult: Balch (ed.), *Examination of Joseph Galloway by a Committee of the House of Commons* (1855); Tyler. *Literary History of the American Revolution* (1897).

GALLOW-GLASS, n. *găl'lō-glăs* [Ir. *galloglach,* a servant: Gael. *gille-choise,* a foot-soldier]: formerly, an Irish heavy-armed foot-soldier; a heavy ax used by him.

GALLOWS, n. *găl'lōz* [Goth. *galga;* Ger. *galgen,* a cross: Icel. *galgi,* gallows, a gibbet: comp. Gael. *gallan,* a branch]: two upright posts, with a crossbeam on top, from which criminals are hanged; one who deserves to be hanged on the gallows; in *Scot.* and *prov. Eng.,* braces for trousers. Gallows-tree, the gallows, or the wood for it. Gallows-bits, on *vessels,* two strong frames of oak, to which the spare topmasts and yards are lashed. Pit and Gallows: see Fossa et Furca: Execution: Hanging.

GALLUS. See Gallinaceous Birds.

GALOCHE, or GALOSHE, n. *gă-lôsh'* [F. *galoche*, a clog: OE. *galache*, a wooden sole fastened by a strap to the foot]: overshoe of caoutchouc or leather for keeping the feet dry in wet weather: now more frequently called GOLOSH (see GOLOSHES).

GALOIS, *gâ-lw'â*, EVARISTE: 1811, Oct. 26, d. 1832, May; b. France: mathematician. Scarcely anything is known of his education and early life; but it is probable that he was exceedingly precocious in mathematics; as in a career of less than 21 years he went beyond the results of Lagrange, Gauss, and Abel in attempts to perfect the algebraical solutions of equations by radicals.

GALORE, ad. *gă-lōr'* and GOLORE' ad., or GILLORE', ad. [Gael. *gu*, to; *leoir*, or *leor*, sufficiency]: in *Scot.* and *prov. Eng.*, in abundance; in great plenty.

GALOUBET, n. *ga-lô'bā* [F.]: small flute of primitive character with three holes, similar to the picco pipe.

GALT, *gawlt:* town of Canada, province of Ontario on Grand river, 55 m. from Lake Erie. The eastern and western parts of the town are connected by bridges. The environs are noted for beauty. The first house was built 1816, amid a dense forest of pines. The inhabitants are largely of Scotch descent. There are numerous places of public worship, improved waterworks, electric and gas lighting, a grammar school, and an extensive library and public reading-room in connection with a mechanics' institute. Among the industrial establishments are woolen manufactories and iron foundries; also extensive flour-mills. The manufacture of edge-tools is an important industry. A branch of the Great Western railway passes through Galt. The local affairs are managed by a mayor and council of 15 members. Pop. (1901) 7,866.

GALT, SIR ALEXANDER TILLOCH, Canadian statesman: b. London, England, 1817, Sept. 6; d. Montreal, 1893, Sept. 19. He was a son of John Galt (q.v.) and went to Canada while still a boy. He made a fortune in the service of the British and American Land Company; was Canadian minister of finance in 1858-62, 1864-66, and in 1867; and Canadian high commissioner to England in 1880-3. He published *Canada from* 1849 *to* 1859.

GALT, JOHN: 1779, May 2—1839, Apr. 11; b. Irvine, Scotland: novelist. His father was capt. of a ship in the W. Indian trade. Galt received his education in Greenock, and was then in the custom-house till 1804, when he went to London with an epic poem, which he printed, but afterward withdrew it from the market. For his health he sought a more genial climate, and at Gibraltar, made the acquaintance of Lord Byron—flushed with his first success in the *English Bards and Scotch Reviewers*—and his friend Mr. Hobhouse; and the three travellers became fellow-travellers for a time. In Greece he renewed his acquaintance with Byron, and

then proceeded to Constantinople, and to the shores of the Black Sea. On his return, he published *Letters from the Levant;* and 1820 *The Ayrshire Legatees,* in *Blackwood's Magazine. The Annals of the Parish,* a far superior work, in the following year, had great success. In the same vein he produced *Sir Andrew Wylie, The Entail, The Steamboat,* and *The Provost,* with great rapidity. Various historical romances which followed, were of less interest. He was busily engaged in the formation of the Canada Company; for which country he departed 1826; but, disappointed, he returned to England after a year or two, and published more novels, a *Life of Lord Byron,* and (1834) *Literary Miscellanies,* three volumes. He returned to Scotland, broken in health, and died at Greenock.—Gault was an unequal writer; but had a great gift for depicting provincialism, and life as it flows on in small towns and villages—communities in which the successful shop-keeper may aspire to be the chief magistrate, and in which the minister is the most important personage. His son became known as a Canadian statesman.

GALTON, *gawl'ton,* Francis, f.r.s.: author: b. Duddeston, England, 1822: cousin of Charles Darwin. He was educated at King Edward's School, Birmingham, and King's College, London, studied medicine, and graduated at Trinity College, Cambridge, 1844. In 1846 he traveled through n. Africa, and on the White Nile, 1850 assisted in exploring the unknown Demara and Ovampo lands in s. Africa, and soon after entered the British civil service in the board of trade. He has been an officer and member of many scientific societies; and, has published *Narrative of an Explorer in Tropical South Africa* (1853), for which he received the gold medal of the Royal Geographical Soc.; *Art of Travel; or Shifts anl Contrivances in Wild Countries* (1855, 5th ed. 1872); *Meteorographica* (1863), the first attempt to chart the progress of the elements of the weather and establish the existence and theory of anti-cyclones; *Hereditary Genius; its Laws and Consequences* (1879); *English Men of Science; their Nature and Nurture* (1874); and *Inquiries into Human Faculty and Development* (1883).

GALUPPI, Baldassare, *bäl-däs-sä-rā · gä-loo'pē,* Italian composer: b. island of Burnao, near Venice, 1706, Oct. 18; d. Venice 1785, Jan. 3. He was sometimes called 'il Buranello.' From 1722 he was an organist in Venetian churches, and he early wrote an opera, *Gli amici rivali.* After study of advanced composition as a pupil of Lotti, he again turned to writing, and achieved notable success with more than 70 comic operas, among them: *Il mondo della luna,* and *Il mondo alla-roveseia.* He has generally been considered the originator of comic opera (opera buffa) in Italy. He wrote also some sacred works, but none of his compositions is known to-day save a harpsichord sonata which finds

place in Pauer's *Alte Klaviermusik.* He is apostrophized by Browning in *A Toccata of Galuppi's.*

GALVANI, *gâl-vâ'nē,* Luigi: 1737, Sep. 9—1798, Dec. 4; b. Bologne, Italy: physician and anatomist. Intending to devote himself to a monastic life, his studies in the Univ. of Bologna were directed to scholastic philosophy rather than to general science. The influence of friends turned him to the profession of medicine; and he selected especially the departments of physiology and comparative anatomy, studying under some of the most eminent medical professors of the day —Beccaria, Tacconi, and Galeazzi whose gifted daughter he subsequently married. He soon gained distinction and 1762 was elected prof. of anatomy in the institute of his native city. His lectures, though not remarkable for eloquence, were clear, accurate, and comprehensive. His writings are not numerous, but all are characterized by rare precision and minuteness of details. Two treatises, which added considerably to his reputation, are —*Considerations on the Urinary Organs,* and *On the Organs of Hearing of Birds.* But to a purely casual discovery Galvani owes the wide celebrity attached to his name. Many versions of this occurrence have obtained credence; but the simple fact seems to be, that Galvani's wife, a woman of penetrating intellect, happened one day to witness with surprise the convulsive muscular movements produced in a skinned frog by its inanimate body having been accidentally brought into contact with a scalpel which lay on the table, and had become charged by contact with an adjoining electrical machine. She hastened to communicate the interesting phenomenon to her husband, who at once instituted a prolonged series of experiments (see Galvanism; Electricity, Animal). Some time before Galvani's death he had lost his wife and had been deprived of all his public emoluments in consequence of his refusal to take the oaths prescribed by the Cisalpine Republic, of which Bologna then formed a part. His writings have mostly been published in the memoirs of the Bologna Institute of Science, including the most remarkable production of his pen, the treatise *De Viribus Electricitatis in Motu Musulari Commentarius.*

GALVANIC BATTERY. See Battery Electric.

GALVANIC CURRENT: old name for continuous currents used in therapeutics.

GALVANIZE: to cover iron with a coating of zinc.

GALVANISM, n. *găl'văn-ĭzm* [from *Galvani,* of Bologna, the discoverer]: the electricity developed from the chemical action which takes place from certain bodies placed in contact, as from two plates of dissimilar metals. Gal'vanol'ogy, n. *-ŏl'ŏ-jĭ* [Gr. *logos,* a discourse]: a treatise on. Galvanic, a. *găl-văn'ĭk,* of or

pertaining to galvanism. GAL'VANIZE, v. *-văn-īz*, to effect with galvanism. GAL'VANI'ZING, imp. GAL'VANIZED, pp. *-īzd*. GALVANOG'LYPHY, n. *-og'lĭ-fĭ* [Gr. *gluphō*, I hollow out, I engrave]: process of engraving in which the ground is spread on a clean zinc plate and etched. Succeeding coats of varnish are spread by a roller on the ground, avoiding the obliteration of the lines, which become deeper with each coat. The finished plate becomes a matrix for a reverse impression obtained in the electro-bath, and this reverse is used to print from in the ordinary manner. GAL'VANOM'ETER, n. *-ŏm'ĕ-tėr* [Gr. *metron*, a measure]: an instrument for detecting currents of electricity and estimating their amount. GALVAN'OSCOPE, n. *-ō-skōp* [Gr. *skŏpĕō*, I examine or view]: an instrument for detecting slight currents of electricity. GALVANIC BATTERY, an apparatus for generating and accumulating galvanism. GALVANIZED IRON, iron covered with zinc by a peculiar process. GAL'VANOG'RAPHY, n. *-ŏg'ră-fĭ* [Gr. *graphē*, a writing]: a modern process by means of which objects of wood, stone, metal, etc., and coins, plaster-casts, copperplates when engraved, etc., may be exactly copied in copper; also called E'LECTROG'RAPHY: see ELECTROTYPE. *Galvanism* is a branch of the science of electricity treating of the electric currents arising from chemical action, particularly from that attending the dissolution of metals. It is sometimes called Dynamical Electricity, because it deals with current electricity or electricity in motion, and is thus distinguished from Frictional Electricity, which is called Statical in consequence of its investigating the electric condition of bodies in which electricity remains insulated or stationary. These terms, though in the main thus properly applied, are in all strictness applicable to both sciences. Frictional electricity, though small in quantity, can pass in a sensible current, and galvanic electricity, though small in tension, can be made to manifest the attractions and repulsions of stationary electricity. Thus the series of discharges transmitted in a wire connecting the prime conductor of a machine in action with the ground, possesses, though feebly, the characteristics of a galvanic current; and the insulated poles of a many-celled galvanic battery manifest before the current begins the electric tension of the friction machine. See ELECTRICITY; INDUCTION; MAGNETISM.

Historical Sketch.—The science of galvanism dates from the close of the 18th c. In 1780 Galvani (q.v.) in making investigations on the nervous irritability of cold-blooded animals, discovered by accident that the limbs of a recently killed frog, when hung by the crural nerve on a metal support near an electric machine, contracted convulsively at the recurrence of each spark. This he properly accounted for by the back-stroke. Six years afterward (1786), in experimenting on atmospheric electricity with frog limbs as delicate electro-

scopes, he obtained, also accidentally, the same convulsions by bringing the copper hook on which the nerve hung, and the limb itself, simultaneously in contact with an iron railing. The similarity of the result led him to attribute it to the same cause—viz., electricity either existing in the limb itself, or produced in the conducting arc of metal. On consideration, he adopted the former hypothesis, regarding the limb as a self-charging Leyden jar, with the nerve as the brass knob and wire; the interior of the muscle as the inner coating, its exterior the outer coating, and the metal arc as the discharging tongs. He published his researches 1791. Volta, 1792, discarded the account given by Galvani of his experiment; and from the fact that the convulsions in question took place with more energy when there were two metals in the conducting arc instead of one, attributed the source of electricity to the heterogeneity of the metals employed. He maintained that at the surface of contact of two different metals an electric force arising from their heterogeneity is generated, which throws them into different tensions. This doctrine forms the fundamental principle of the *contact theory* of galvanism. In reply to Volta, Galvani proved incontestably that the contraction in the limbs of the frog took place when only one metal was employed, and even when the conductor was not of metal at all. Subsequent discovery has proved Galvani partly right in attributing the cause of these convulsions to animal electricity, also Volta partly right attributing them to electricity generated in the metal arc, for both causes may work in producing the result. Volta's theory of contact is still maintained, though another theory obtains no less support which attributes the source of galvanic electricity to the chemical action of a liquid on a metal coupled with another metal less easily acted on than itself. Fabroni, prof. at Florence, was the first (1792), to suggest chemical action as one of the causes at work in Galvani's experiment. Volta did not accept of Galvani's view and proof, but supported his theory by several apparently conclusive experiments. In 1799, he constructed, as the crowning evidence of the truth of his reasoning, his pile, and with it properly begins the history of galvanism. To Galvani is thus due the merit of discovering a new manifestation of electricity; to Volta is due the merit of displaying in it a source of power of incalculable importance, and which, but for his genius, might have remained among the barren curiosities of science. Among distinguished contact theorists are Volta, Ritter, Pfaff, Biot, Deluc, Ohm, Fechner and Sir William Thomson; and among chemical theorists, Fabroni, Davy, Wollaston, Parrot, De La Rive, and Faraday. Davy maintained a theory of distribution and equilibrium of electricity midway between the two, supported by Jæger, Berzelius, Ermann, and Prechtl.

OCT 21 1911

One copy del. to Cat. Div.

OCT 21 1911

LIBRARY OF CONGRESS
0 033 261 279 7